

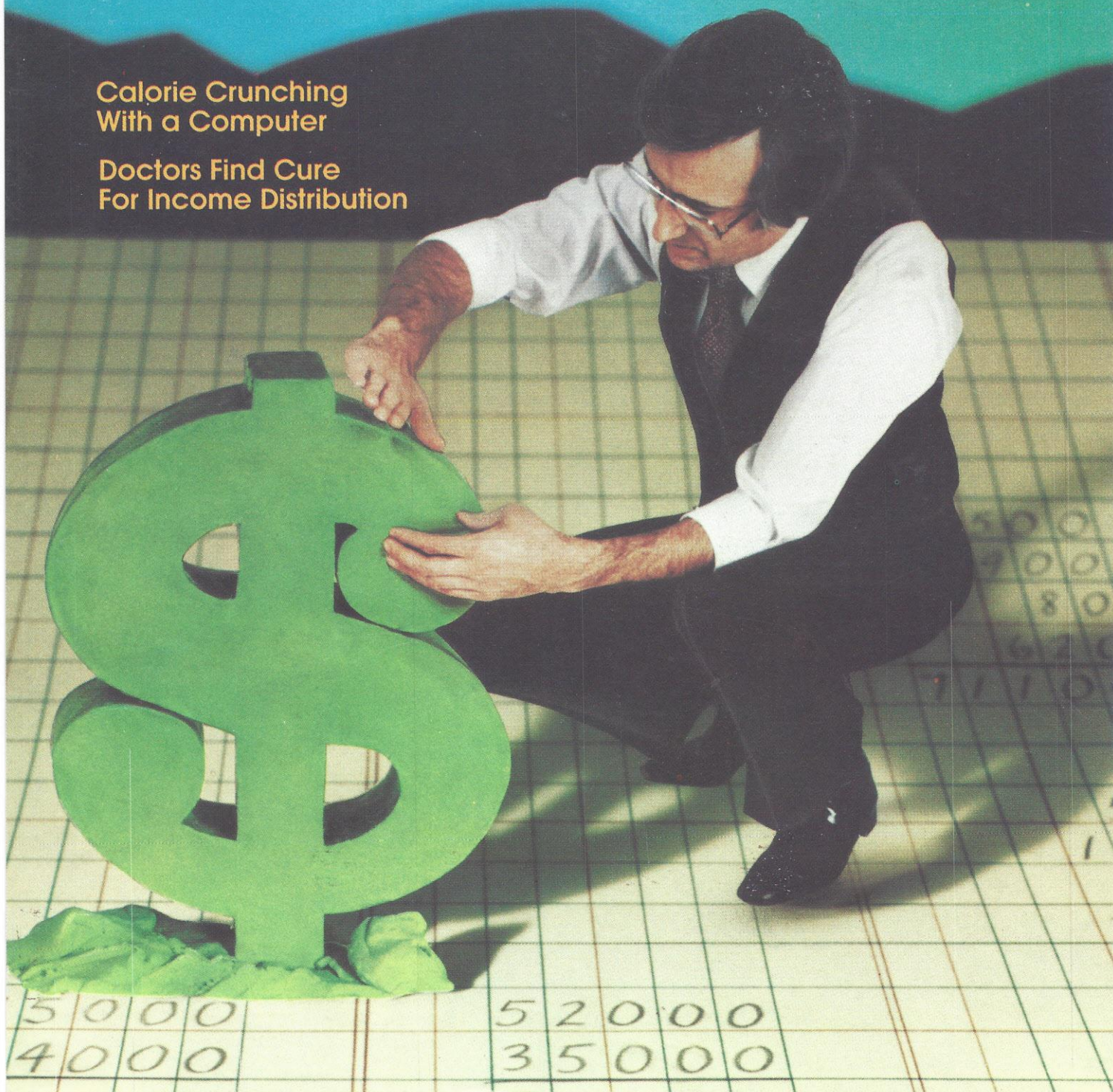
PERSONAL COMPUTING

JUNE 1981
\$2.00

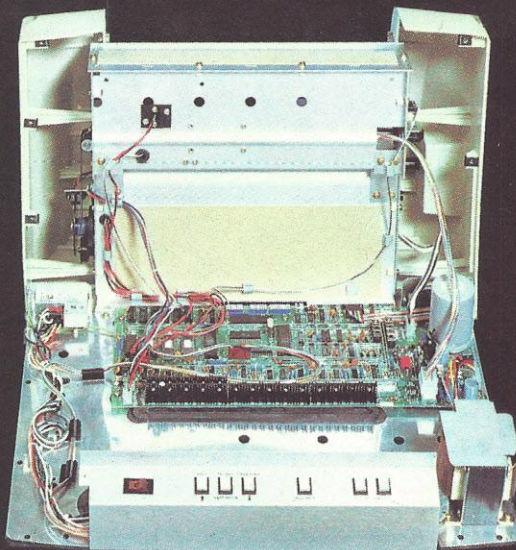
Financial Modeling Software: Tools for the Overworked Manager

Calorie Crunching
With a Computer

Doctors Find Cure
For Income Distribution



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Our New grafixPLUS™ 80-column printer opens wide for easy servicing.

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...the plus in printers

CIRCLE 1

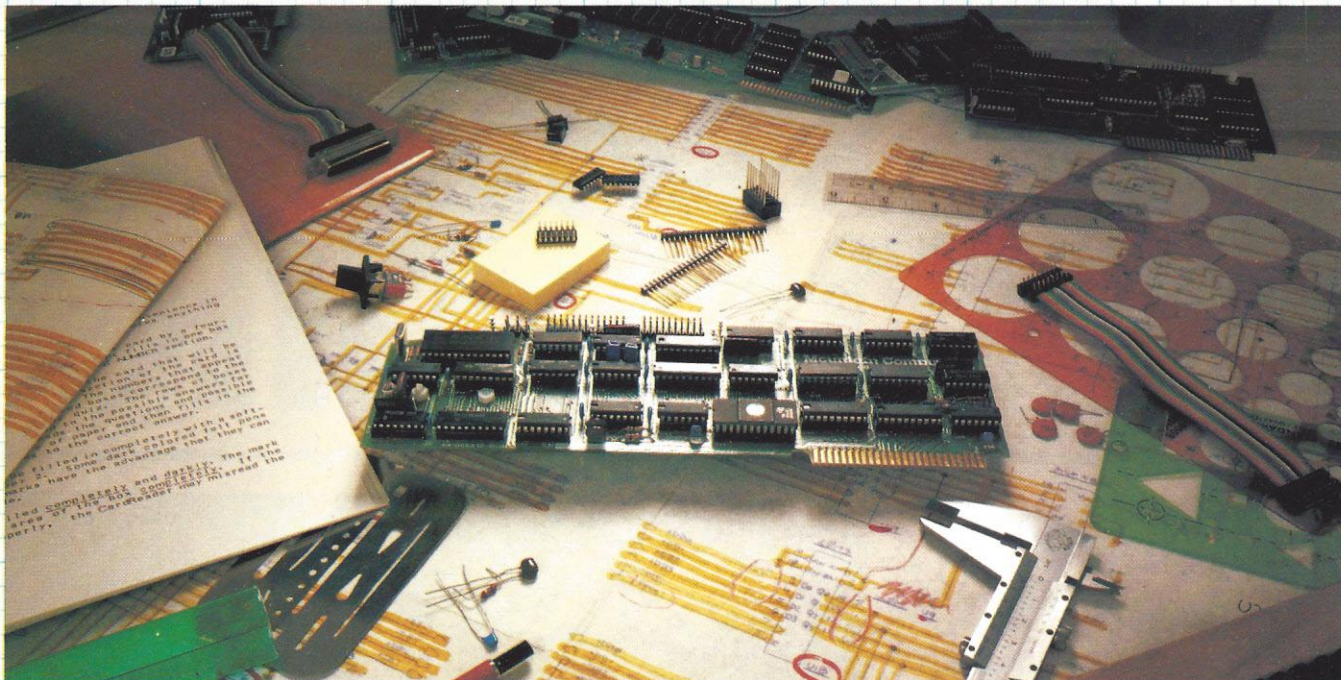


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- Features auto-line feed, transparent terminal mode, Apple tabbing, line length, delay after carriage return, local echo of output characters, simultaneous serial/parallel output, lower to upper case conversion, discarding of extraneous LFs from serial input
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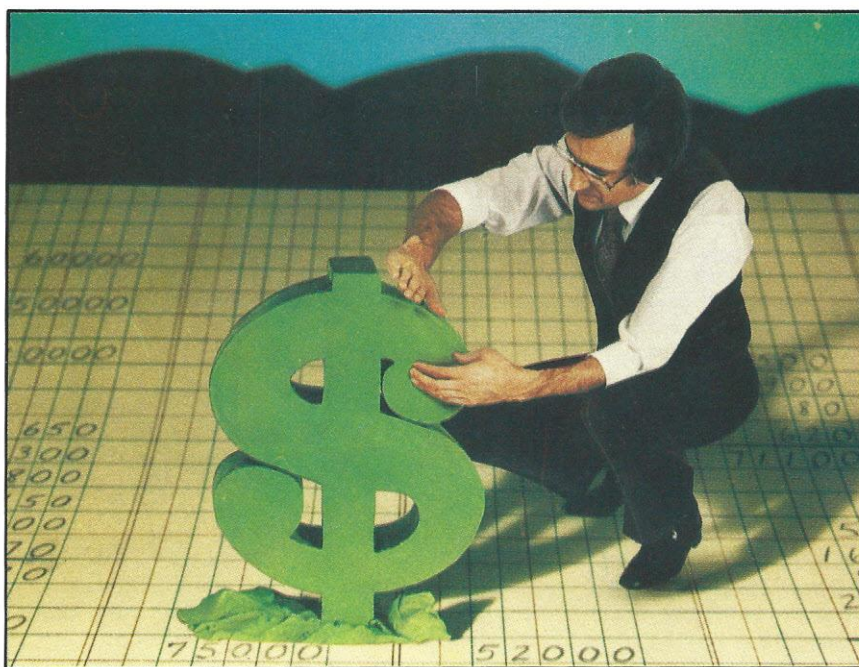
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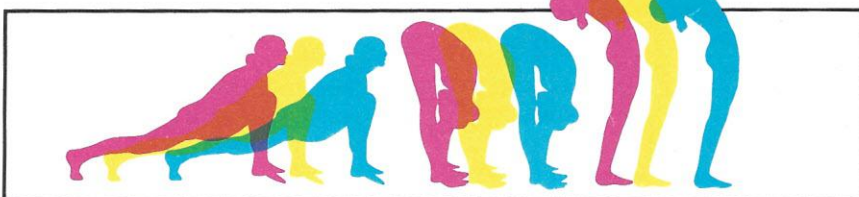
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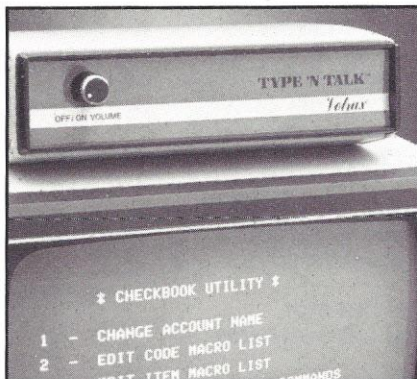
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52 DOCTORS FIND CURE FOR PROFESSIONAL INCOME DISTRIBUTION

BY DR. RAY F. KILCOYNE This program shows how a group of physicians solved their problem of distributing income among the members of their professional corporation.

Data Bases

Dear Editor:

"How to Choose Data Base Management Programs," *Personal Computing*, February, 1981, was, as my Uncle Ted used to say after a big Sunday dinner, a good sample. By all means let's have more critical reviews of software.

I don't have the time to go below the high level Language and would expect to use off-the-shelf programs. Because so many programs are written for a specific machine, I must select the programs and then the machine. That's not easy; I can use all the help I can get.

George F. Mueden, Jr.
North Bergen, NJ

Wanted

Dear Editor:

I am attempting to compile a list of TRS-80 Model I programs that will (or will not) run on the Model III. I would appreciate any input from your readers.

To those who kindly respond, please mention if the program was on disk or tape—BASIC, SYSTEM or disk CMD file—whether run under Level II or DOS, and, if DOS, which one? Are there any changes needed to be made to the program, and if so, what are they?

All those who send me information will be sent the compiled list (after a reasonable length of time to get all input) if a self-addressed stamped envelope is included with your information.

Thank you for your help.

Ken Knecht
1340 W. 3rd St. #130
Yuma, AZ 85364

Club Drive

Dear Editor:

I am hoping to start a club in the Northern New Jersey/New York City/Long Island area for anyone

interested in building or working with robots. I would like to get a list together of all the people interested in joining such a club or working with robots.

Even if you are too far away to attend a meeting, keep in touch with me. I might hear of a local club in your area. The meeting time and place have not been picked yet but will probably be on a week night in New York City. If you have any questions or problems with robots, write me, I might be able to help.

David Smith
4505 Kennedy Blvd.
North Bergen, NJ 07047

An Opinion

Dear Editor:

I'm an economics student who's avidly interested in single user systems. I read most of the magazines and would like to relate to you my opinion regarding what kind of articles are most appropriate and likely to be read in these magazines.

The main thing that prompted me to write was that I found five articles that were of interest in the April issue of *Personal Computing*. This is far more than I usually find in your magazine. The articles were:

- 1) Disk Memories
- 2) Choosing An Assembler
- 3) Introduction to Printer Interfaces
- 4) Computers And Education
- 5) How To Boot A Binary Program

(1) and (3) fall into the same category, that of tutorial information on aspects of computer systems. I would love to see more articles of this sort. It's the sort of thing that is fairly simple and useful to computer owners but is hard to find. Manufacturers usually assume that you already know these things. (2) was useful . . . how about an article on "choosing a Pascal compiler." I also like articles such as (4). I would much rather read about significant developments in computer applications than read another "keep track of your recipes in BASIC" type article. System utilities such as (5) are useful, informative and very ap-

PERSONAL COMPUTING

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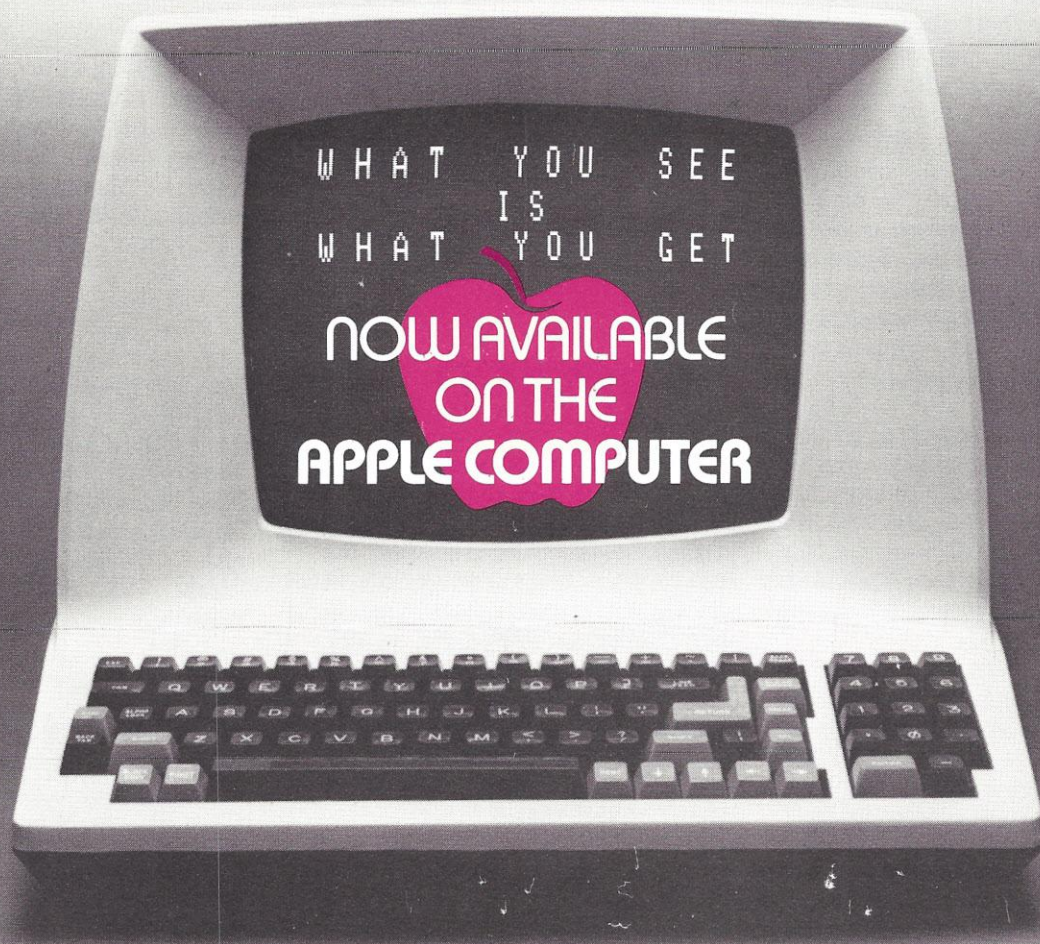
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*Runs on most Z80/8080/8085 microcomputers with CP/M (TM of Digital Research); 48K, and terminal with addressable cursor. Apple computer installation requires MicroSoft Softcard and 80 column video board.

CIRCLE 3

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proprate for the magazine. Prospective buyers can learn about some of the shortcomings that computer salesmen don't tend to talk about, and owners can learn a little about what goes on under the hood of their machine.

The type of article which I really hate is the "keep your recipes on your home computer" type articles. I would rather write a program than read someone else's program. Besides, the short space available in magazines is not conducive to illustrating programming style. Perhaps the low quality of micro software can be in part attributed to the fact that some microcomputer programmers learn to program from the stripped down programs that are published in magazines. I also hate articles such as "word processors explained" or "data base programs explained". It is really difficult, and I believe, a waste of time, to explain such software by writing about it. There are many word processors and dbms programs available, and the best way to see how they work is to try using one. If this were 1965, and these applications were on the frontier of computing, then I could see writing about them, but it's not and they're not.

I would like to see more articles of the following types: "future directions in the microcomputing industry," "efforts to make self-programming computers," or "Wall Street's view of microcomputers."

Before I close the letter, please suffer me to spout my views on the subject of your April editorial, that of "software piracy." I agree that software piracy is immoral, but to paraphrase Milton Friedman, one incentive is worth a thousand sermons. It is time to stop telling people to be good—we need some real measures to overcome the problem. This will never happen as long as we rely on programmers and engineers for an analysis of the problem. The problem requires the skills of a) the economist, and b) the financial analyst. As I see it there are two possible solutions to the problem. One is that since software is a public

good (ie. a good whose consumption by one party does not limit its consumption by others) like roads, perhaps software should be paid for the like roads are—by earmarked taxes (viz. gasoline and auto excise taxes). Perhaps such a radical step could be avoided if the industry could come up with better ways to finance programmers such that greater volume and lower prices could be achieved. I plan to do a paper about this for one of my classes, but the industry or the government really should fund professional researchers to investigate the problem. (or it would be a good project for a magazine such as yours)

Russell Garrard
Chicago, IL

Correction

Dear Editor:

Thank you for printing my letter in your March issue. Unfortunately, somewhere during the publishing process, three errors crept into the changes I sent you to correct a bug in the Goblin program, published in your December 1980 issue. In line 4065, the "plus" sign should be a "times" sign. Also, in line 4066, the last two "equals" signs should both be "plus" signs. The entire correction is repeated below:

```
4040 T1=INT (SO/6.1) + 1
4045 K=6
4050 IF K >= SO THEN 4065
4055 K=K+6
4060 GOTO 4050
4065 T2=(5-(K-SO))*6
4066 IF I2>2 THEN I1=42+T1+T2
4067 IF I2=3 THEN I1=I1+6
4070 T$=DO$(I1,I1)
```

In the March issue you also published a correction submitted by Mr. David W. Hamaker. Mr. Hamaker's version is quite clean and much more consistent with the original code. It is most likely the code intended by Mr. Nicholson, the original author of the game.

Roy S. Reichert
Warren, NJ

JUNE

June 1-3—USING PASCAL / ADA FOR INCREASED PROGRAMMING EFFICIENCY; Holiday Inn Lakeshore Drive, Chicago, IL; Datapro Research Corp., 1805 Underwood Blvd., Delran, NJ 08075; (609) 764-1010.

June 16-18—BASIC: A COMPUTER LANGUAGE FOR MANAGERS; AMA Headquarters, New York, NY; American Management Associations, 135 W. 50th St., New York, NY 10020; (212) 586-8100.

June 17-19—USING PASCAL/ADA FOR INCREASED PROGRAMMING EFFICIENCY; Holiday Inn Union Square, San Francisco, CA; Datapro Research Corp., 1805 Underwood Blvd., Delran, NJ 08075; (609) 764-0100.

June 22-24—BASIC: A COMPUTER LANGUAGE FOR MANAGERS; Logan Airport Hilton, Boston, MA; American Management Associations, 135 W. 50th St., New York, NY 10020; (212) 586-8100.

June 24-27—MICROCOMPUTER DESIGN INTERFACING, PROGRAMMING, AND APPLICATION USING THE Z80/8085/8080; Virginia Polytechnic Institute and State University; The Department of Chemistry and the Extension Division of Virginia Polytechnic Institute, Blacksburg, VA 24061; (703) 961-5241.

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- **First Drive Includes DOS:** OS-80™, Percom's fast extendable BASIC-language disk operating system, is included on diskette when you purchase an initial drive kit. Originally called MicroDOS, OS-80 was favorably reviewed in the June 1980 issue of Creative Computing magazine.
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The DOUBLER includes a TRSDOS*-like double-density disk operating system called DBLDOS™.

We also offer a double-density Model I version of OS-80 as well as DOUBLEZAP programs for modifying NEWDOS/80 and VTOS 4.0† for DOUBLER compatibility.

Of course you don't have to upgrade your computer for double-density operation to use Percom mini-disk drive systems. In single-density operation, our TRS-80* Model I compatible 40-track drives store 102 Kbytes of formatted data on one side of a diskette, and our 80-track drives store 205 Kbytes. By comparison, Tandy's standard drive for the Model I stores just 86 Kbytes.

And like our Model III drives, Model I add-on drives are optionally available with "flippy" storage capability.

System Requirements:

Model III: 16-Kbyte system (min) and Model III BASIC. The second internal drive may be installed after the first internal drive kit is installed, and external drives #2, #3 and #4 may be added if either an internal or external first-drive kit has been installed. External drives #3 and #4 require an optional interconnecting cable.

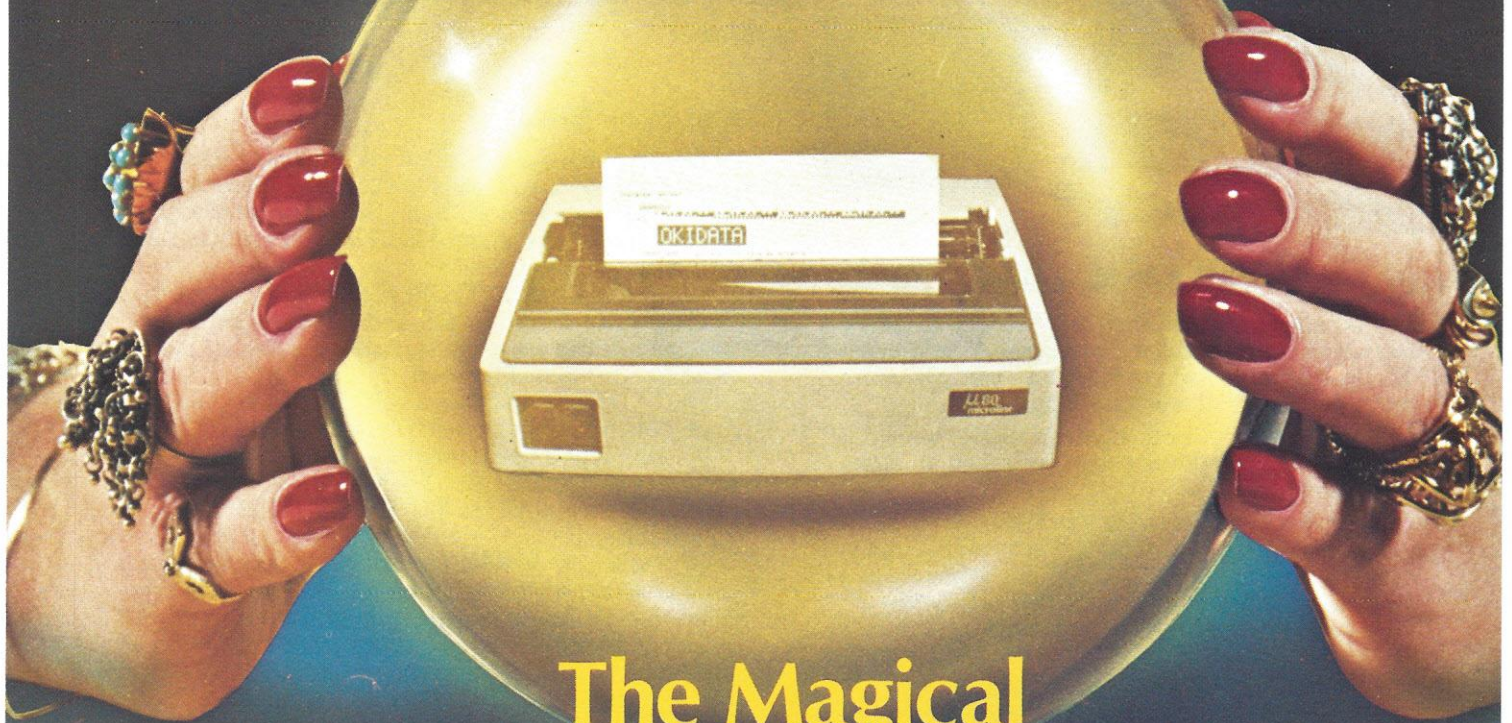
Model I: 16-Kbyte system (min), Level II BASIC, Expansion Interface, disk operating system and an interconnecting cable. For double-density storage, a Percom DOUBLER must be installed in the Expansion Interface and DBLDOS (comes with the DOUBLER) or other double-density DOS must be used. For single-density operation, a Percom SEPARATOR™ adapter, installed in the Expansion Interface, will virtually eliminate "CRC ERROR — TRACK LOCKED OUT" read errors. Prices and specifications subject to change without notice.



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CIRCLE 5

MICROCOMPUTER ROUND-UP

Today's Personal Computers: Products for Every Need—Part II

With so many personal computers available today, it's hard to know which system is designed to solve the types of problems that you may wish to solve. This month, Personal Computing takes the second of a two-part look at a cross section of some of the personal computers on the market.

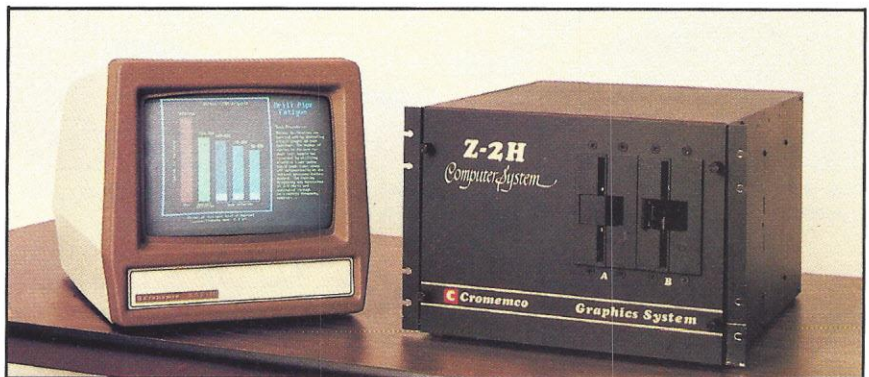
Altos Computer Systems

Altos Computer Systems, Inc. offers a broad range of computer system configurations to meet nearly every need. The firm's Altos Sun Series ACS8000 line of machines, which embraces 24 separate systems, covers the gamut from the ACS8000-XS with its single 8-inch floppy disk drive for personal use to the ACS8000-6 with up to 58 million bytes of hard disk storage capacity and supporting up to four users at once.

If your application will run with on-line storage of four megabytes (four million bytes) or less, the ACS8000-XS single drive system offers a portable, compact solution. This single drive unit can be used for word processing, data entry and retrieval, remote terminal operations and personal and home application functions. With 32 to 64K bytes of Random Access Memory (RAM), the Altos-E Monitor stored in 1K of Read Only Memory (ROM), and the availability of Direct Memory Access (DMA), the ACS8000-XS allows fast response and relative ease of operation to someone who is comfortable around sophisticated machinery. DMA provides a direct means of making transfers of data between the on-



Altos Computer Systems' Series ACS8000 includes 24 separate computer configurations ranging from a single 8-inch floppy disk system to a hard disk system.

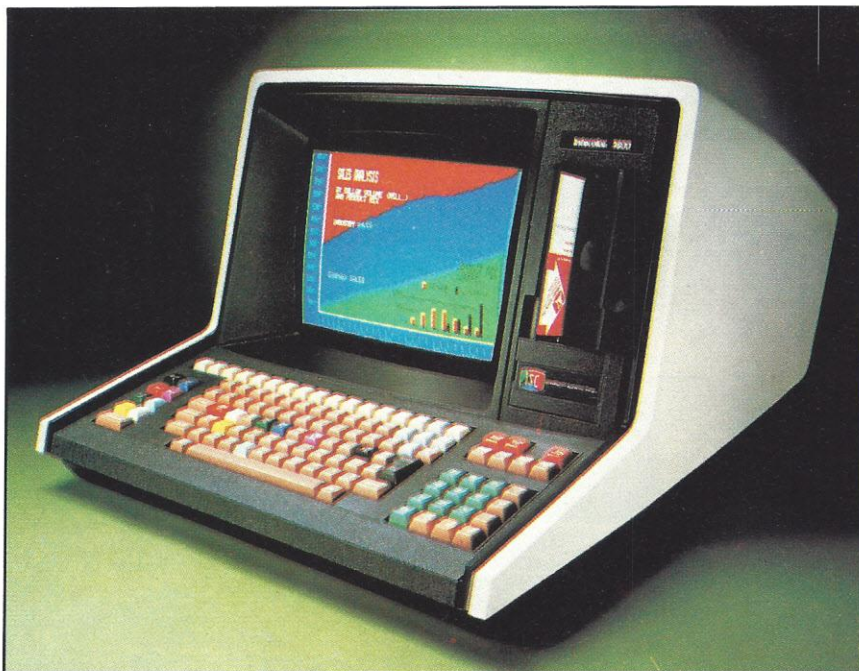


Cromemco's Z-2 computer line is directed toward business, scientific and engineering professionals.

board RAM and the floppy disk in either direction without burdening the Z80 microprocessor with the housekeeping tasks associated with that transfer.

Communication with external devices is accomplished via two standard RS-232-C serial output ports and a pair of 8-bit parallel input/output ports as standard equip-

MICROCOMPUTER ROUND-UP



Intelligent Systems Corp.'s Intecolor system offers the advantages of color graphics and a built-in disk drive in a self-contained unit.



The Superbrain Video Computer from Intertec Data Systems features twin Z80A microprocessors and two double-density minifloppy disk drives.

ment. This means you can choose a terminal and printer from any of several major manufacturers.

The ACS8000-XS supports AMEX (Altos Multi-User Executive), Digital Research's CP/M and MP/M or Phase One's OASIS operating systems. The unit supports seven high level languages: BASIC, Pascal, COBOL, FORTRAN, APL, ALGOL and C. System utilities are also provided.

When memory requirements, either on board or on-line, exceed the ACS8000-XS system, you can move up to the dual-drive ACS8000-X system. With this unit, you can have from one-half to two full megabytes of floppy disk storage depending on the configuration you choose. In addition, the ACS8000-X allows you to have as much as 208K bytes of on-board RAM which you can access in banks

of 48K. If you need more than two megabytes of on-line storage, you can add a third and fourth floppy disk drive to your system to give you up to four megabytes of storage.

Prices for Altos systems range from approximately \$6,000 to over \$12,000 for the more sophisticated units.

Cromemco Z-2

Cromemco's line of Z-2 computers is directed toward serious business, scientific and engineering professionals although the low end of the firm's line falls within the budgets of personal computer and small business owners. The upper end of the line includes 11 megabyte hard disk drives, memory expansion up to 512K and a multiuser system capable of handling up to eight stations.

The Z-2 is a Z80-based machine featuring: 21 slots for memory and input/output boards, room for two minifloppy disk drives and S-100 compatibility. The unit comes in a 19-inch-wide cabinet suitable for rack mounting. User input and output to a Z-2 is generally accomplished via a CRT terminal. Because of the S-100 compatibility of the unit, there are many peripherals available for it. Price for the Z-2 is approximately \$8,000.

If you add minidisk drives to a Z-2, you then have a system referred to by Cromemco as the Z-2D. The Z-2D is available with one or two 5¼-inch drives and has an RS-232 serial interface. The company's Z-2s can easily be upgraded to the Z-2Ds. Cost of a Z-2D is approximately \$9,000.

Cromemco's System Three computer is a Z-80 based, S-100 compatible unit with up to 512K of memory. A basic unit comes with 32K of random access memory and dual floppy disk drives providing 512K of storage. Up to 1.4 million bytes of storage on four drives is possible.

The System Three is a professionally oriented computer with a variety of program packages available for it including: FORTRAN IV, COBOL, 3K Control BASIC, 16K BASIC,

continued on page 13



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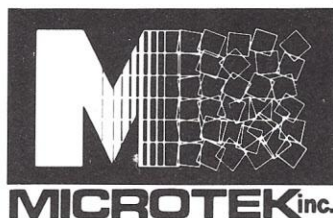
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CIRCLE 7

MICROCOMPUTER ROUND-UP

32K Structured BASIC, multiuser BASIC, word processing with a screen editor and formatter, and assembly language.

Primary uses of the Cromemco systems are in household management, professional offices, and small businesses. The primary application is in word processing.

Cromemco and independent companies offer a variety of options for the Cromemco computers which makes them versatile machines.

Exidy Sorcerer

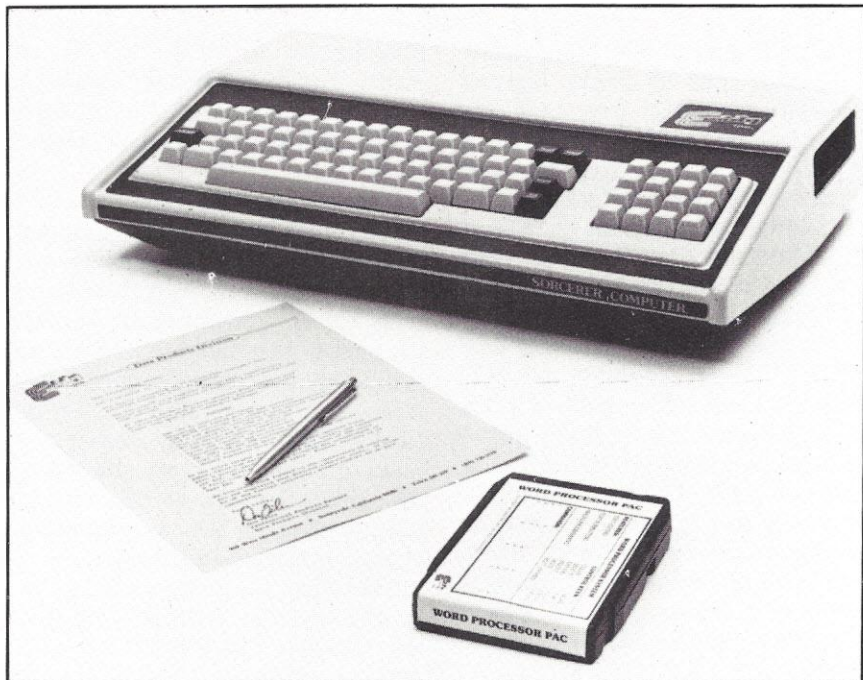
Exidy Inc., famous as a video game manufacturer, introduced its personal computer, the Sorcerer, in 1978. The machine features a Z-80 microprocessor and Read Only Memory cartridges (ROM PACs) that allow you to plug in a number of computer languages and specific application programs such as one that is available for word processing.

The Sorcerer's keyboard, designed for beginners as well as data processing professionals, consists of 63 keys of upper and lower case and graphic characters, and a 16-key numeric keypad for rapid information entry. The keyboard has a graphics key and unique graphic symbols engraved on the keyboard. By depressing the graphics and shift lock keys, you may use the graphic symbols as you would ordinary text and you can create any image you wish. User-defined graphic symbols allow you to create symbols or geometric forms. The Sorcerer keyboard can generate a total of 256 characters; 192 are predefined while the other 128 are programmable which means you can define them yourself.

A 12-inch, high resolution television monitor (\$499) is the unit's standard output device and it displays thirty 64-character lines.

The Sorcerer comes in three Random Access Memory configurations: the 16K Model DP 1000-2 (\$1295); 32K Model DP 1000-3 (\$1395); and the 48K Model DP 1000-4 (\$1495). For systems with less than the maximum 48K RAM, Exidy offers a 16K expansion kit for \$160.

Sorcerer ROM PACs look and feel



Introduced in 1978, Exidy's Sorcerer comes in three RAM configurations (16K, 32K, 48K) and interfaces to two cassette recorders and a disk unit.

like 8-track tape cartridges but they contain programs (on printed circuit boards) to allow you to get maximum use of the machine's capabilities. When a ROM PAC is inserted into a system, it becomes part of the computer's Read Only Memory and the program imprinted in the ROM PAC becomes accessible to the central processing unit. The Sorcerer's monitor program resides in 4K of ROM and is always present in the computer so that when the power is turned on, the monitor goes into operation and provides keyboard control.

The basic Sorcerer computer is designed to handle two cassette recorders and a disk unit as peripheral storage devices. The unit comes with an RS-232 serial input/output port, parallel data port, and S-100 connection port.

Exidy's S-100 Expansion Unit (\$419) has an independent power supply, 6-slot chassis, S-100 translation logic card and is styled and colored to match the computer.

Attachments for a Sorcerer include the 12-inch video display, a display/disk unit, floppy disk sub-

system, floppy disk add-on, dot matrix printer and Daisy wheel printers. A wide variety of software is available including languages, system software and application software.

The company offers a number of disk-based systems that range in price from \$4,500 to over \$7,000.

Intelligent Systems

Intelligent Systems Corp., which claims to be the largest manufacturer of color alphanumeric/graphics terminals in the world, offers a wide variety of desktop computer systems.

ISC's Intecolor system brings you the advantages of color graphics in a sleek, self-contained computer including a built-in minidisk drive that stores 51.2K bytes of information per side with both sides of the diskette usable. An optional, separate disk drive can be added for applications requiring additional on-line storage.

The Intecolor 3621 (\$3,300) includes 32K of Random Access Memory (RAM) for user workspace, 16K Read Only Memory (ROM) and 4K RAM for video refresh. A BASIC

MICROCOMPUTER ROUND-UP

interpreter and a FORTRAN compiler allow you to choose between powerful high level languages. The Extended Disk BASIC interpreter in 8K of ROM includes five command types, 27 statements, mathematical functions, string functions, and 13 File Control System Disk commands. The FORTRAN compiler is by Microsoft.

ISC also offers the Intecolor 8351 (\$5,265), 8951 (\$4,465) and 8051 (\$4,265) series of computers. Common specifications include 8080A central processing units with total memory (both RAM and ROM) expandable to 64K bytes; eight video foreground colors and eight background colors; an extended keyboard featuring 192 ASCII (American Standard Code for Information Interchange) codes, cursor controls, and color and numeric clusters that aid in entering numbers and selecting colors. An optional deluxe keyboard adds 16 special function keys.

Intecolor desktop computers have standard RS-232-C compatible input/output (I/O) ports that allow interfacing to asynchronous modems or host computers at seven keyboard selectable baud rates from 110 to 9600 baud. Optional interfaces include a second RS-232-C port and an 8-bit parallel I/O channel, a third RS-232-C synchronous/asynchronous channel, a 20/60 mA current loop and a 24-bit I/O port.

The ISC machines are available with a wide variety of disk drives including minis, 8-inch floppies and hard disk systems. The most economical models use an 80K byte mini-drive, or, for added capacity, a dual minidisk drive with 160K bytes of storage. The dual 8-inch floppy drives store 591K bytes in the single-head version or 1182K bytes in a double-headed configuration. ISC hard disk drives provide 13 or 26 megabytes of data storage.

ISC offers a series of machines compatible with Digital Research's CP/M operating system. CP/M compatible units (\$6,900 to \$7,900) are equipped with 32K of user RAM

(expandable to 48K), and 8K of ROM. Two disk drives are available: the 591K dual 8-inch floppy drive system and the 1182K double-headed drive.

Intertec Data Systems

The SuperBrain Video Computer System by Intertec Data Systems was first introduced in 1979. It features twin Z80A microprocessors. One processor (the host) performs all processor and screen related functions; the second chip is "downloaded" by the host to execute disk input/output. When not processing disk data, the second Z80 may be programmed by the host for other processor related functions.

Standard features include two double-density minifloppy disk drives with 350K bytes of data storage; 32K of Random Access Memory (expandable to 64K); and Digital Research's CP/M operating System with a high-powered text editor, assembler, debugger and disk formatter. With SuperBrain's S-100 bus adaptor, you can add numerous accessories. Optional software provides FORTRAN, COBOL, BASIC and a variety of application packages.

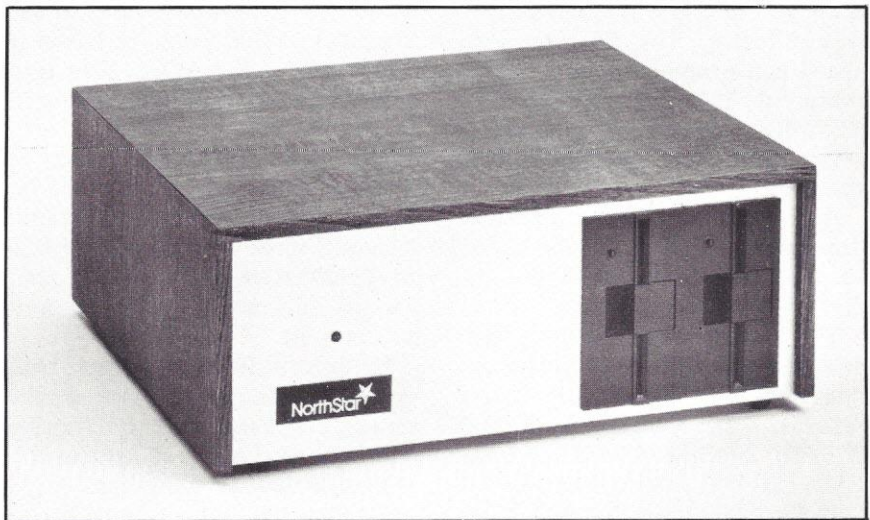
The unit's video display provides 25 80-character lines on a 12-inch screen. Communication to other input and output devices takes place

via dual universal RS-232 serial ports. A parallel interface is also available.

The SuperBrain Video Computer sells for approximately \$3,000 with the upper-end SuperBrain QD going for \$4,000.

In 1980, Intertec introduced its new multi-user, "shared-disk" microcomputer system called the CompuStar. The CompuStar Multi-User System consists of a network of video processing units that employ their own internal microprocessors and RAM. The terminals are tied together in a network fashion to share the resources of a Winchester or other hard disk device. A CompuStar system can be configured using any one of three disk storage devices, all of which are offered by Intertec. The storage devices range from the \$5,000, 10-megabyte model to a 96-megabyte system that sells for nearly \$15,000.

A wide range of capabilities and system flexibility is represented by the four types of CompuStar Video Processing Units. The Model 10 (\$2495) is an intelligent, programmable video terminal equipped with 64K of RAM which can be downloaded from a host system or the CompuStar Disk Storage System and it features its own internal microprocessor. The Model 20



NorthStar's Horizon computer system is a Z80 based S-100 compatible machine that contains two built-in mini-floppy disk drives.



Mattel's Intellivision offers ease of operation and is the only personal computer to offer a tape system that is completely computer controlled.

(\$3,995) contains the same features and adds two double-density minifloppies that allow for 350K of local disk storage. The Model 30 (\$4,495) is the equivalent of the 20 with the addition of double-sided minifloppies to give nearly 750K bytes of storage. Another unit, the Model 40 (\$4,995), offers not only double-sided, double-density drives, but also double-track drives which provide nearly 1.5 megabytes of local disk storage.

Mattel Intellivision

Mattel's Intellivision is a system of modular hardware components and a broad spectrum of software that offers ease of operation because there's no computer language to learn.

The heart of the Intellivision is the Master Component containing a 16-bit microprocessor that delivers a full range of simulated sound effects, three-part harmony, sharp TV resolution and excellent color reproduction. Two 12-button hand-held controllers, each with four play-action keys and a 16-direction object control disk for precise movement of screen objects, are included with the Master Component. The unit attaches to any television set.

By itself, the Master Component

console provides a variety of entertainment and game play through the use of preprogrammed Read Only Memory (ROM) game cartridges. Each game cartridge comes with two custom overlays that fit directly over the keys of the hand controllers.

While the Master Component uses cartridges, the unit's Keyboard Component uses programmed cassettes that contain programs written in Microsoft BASIC. The keyboard features a 60-key, typewriter-like keyboard and a digital cassette system with microprocessor control capable of handling digital and audio outputs as well as typed and audio inputs. A microphone is included in the unit to use with those programs featuring audio input. Intellivision systems can range in price from \$300 to \$800.

NEC-8001

The PC-8001 Personal Computer from Nippon Electric Company (NEC) is a stand alone system consisting of: the PC-8001 keyboard which houses the NEC Z-80 microprocessor equivalent known as the PD780; the NEC PC-8011 Expansion Unit; the PC-8031 mini-disk unit; and the PC-8043 RGB (Red/Green/Blue) Video Monitor.

When disconnected from the ex-

pansion interface, the 8001 comes up in N-BASIC which was developed for the PC-8001 by Microsoft. If the system is attached to a disk drive, the disk operating system is activated.

The computer has a typewriter-like keyboard. In addition to standard alphanumeric keys, the unit has special keys, five of which are programmable. The keyboard also has a 16-key, calculator-style numeric keypad.

The standard unit comes supplied with 24K of Read Only Memory that is expandable to 32K, and 16K of Random Access Memory also expandable to 32K. Features include a cassette interface, a Centronics-type parallel interface, and a TTL-level serial interface. There are also two video interfaces: one is designed to connect directly with the NEC monitor; the other is a connector for the NEC RF modulator which allows you to use the system with any standard home color or black and white television set.

The PC-8001 connects via a cable to the expansion unit which holds space for an additional 32K of RAM, four additional ROM sockets, two serial interrupt-driven RS-232C input/output channels, a floppy disk controller port, four parallel input/output ports, an IEEE-488 interface, an input/output bus connector and a real time clock.

The disk drive component houses its own dedicated microprocessor and is considered "intelligent." The drives themselves are 143K byte, single-sided, double-density units. Facilities are included to add a second pair of disk drives.

The PC-8001 has two modes of operation: BASIC and "terminal." In the terminal mode, the 8001 acts like a terminal (with the addition of an optional RS-232C cable) that can be connected to a modem. The BASIC mode allows you to use the system as a stand alone personal computer.

N-BASIC has 86 commands and statements and 41 functions. Arith-

continued on page 68

Move Up to Tarbell



The Serious Business Machine

Do you have a small computer system that operates with mini-floppies and has limited storage capacity? Then it's time to move up to the Tarbell Empire Series System. Tarbell starts where small systems leave off, providing storage from 1 to 20 megabytes. This means Tarbell is capable of growing right along with your business. (It also makes sense to start with Tarbell if you're a first-time computer buyer.)

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The software includes: CP/M™ 2.2 disk operating system, Tarbell Disk BASIC, Tarbell Database System, and all manuals and documentation.

Tarbell also offers the MP/M™ Multi-User Operating System and 4 additional RS-232 serial ports.

The Tarbell Empire Series is delivered assembled, tested, and with a FULL six-month warranty on parts and labor.

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NEWS

Speech Peripherals Make Computers More Human

Modern technology has made it possible to have computers solve many of our everyday problems but communication with these versatile machines is generally through typing and programming. A logical progression, to increase efficiency and make the computer an essential part of every day life, is to develop a technology that allows us to speak to the computer and have it speak back to us.

Advances in electronic technology have made the talking computer a reality. The technology that has evolved from the need to speak can be divided into two categories: speech synthesis and voice recognition. Speech synthesis can be described as the technology allowing the computer to speak to you in a human-like voice. Voice recognition, on the other hand, allows the computer to listen to your commands and respond accordingly.

Speech can be attained through both hardware and software. For those users requiring high quality speech and are willing to spend a little more money, hardware is the way to go. Software is less expensive but the

speech can sound mechanical in some cases.

The reasons

As the microcomputer industry matured and the need for low-cost peripherals increased, speech became a more feasible market for manufacturers to strive for. "There's no particular reason why speech synthesis devices couldn't have been made a number of years ago," said Philip McLaughlin of General Instruments, a manufacturer of speech related integrated circuits. The technology was available but never developed because of lack of interest.

According to Barry Schiffman of Heuristics, a manufacturer of speech peripherals for the Apple II computer, "lower RAM costs are making speech available as an alternative input media." He also attributes the increase in speech peripherals to improved algorithms in chip manufacturing.

Speech technology was made possible because "companies have found ways to compress speech and put it into solid state memories, says Fred Wickersham of National Semiconductor.

Text to speech

One of the new devices that has just become available as a result of

new technology is TYPE-'N-TALK from Votrax. Developed by a pioneer in electronic speech technology, Votrax's new text-to-speech synthesizer allows the personal computer to talk back to the user in highly intelligible English words and phrases. According to Alfred R. Lubinski, general manager of Votrax, TYPE-'N-TALK words in much the same way as a typewriter for the blind, allowing sightless persons to type English text on a type-

words and phrases on the keyboard. The computer will then speak the words typed. Words can be spoken simultaneously as they are typed, or the device's 750 character buffer will hold the words until the computer is prompted to speak them in entire phrases or sentences.

Typewritten words are automatically translated into electronic speech by TYPE-'N-TALK's microprocessor-based text-to-speech algorithm. The verbal response consists



TYPE-'N-TALK from Votrax is a new text-to-speech voice synthesizer which sells for \$345.

writer keyboard and hear a verbal "echo" of the characters or words just typed.

This device can be used in conjunction with any computer that has an RS232C serial interface and permits the user to type an unlimited combination of English

of electronic-generated phonetic speech which is heard through an audio loud-speaker. The price of this product is \$395.

Votrax also offers a phonetic voice synthesizer in the form of a kit for system designers who wish to incorporate unlimited speech capability

into their products. The Votrax Speech PAC (Phoneme Access Controller) is a self-contained circuit board consisting of a CMOS silicon speech chip, external controller, memory and on-board audio amplifier. The unit comes pre-programmed with 250 stored words and phrases which can be intermixed with phoneme sequences to provide unlimited vocabulary. The price of this product is \$275.

One of the first

Texas Instruments's learning aid, Speak & Spell, introduced in 1978, has been a model for many other manufacturers to follow. After introducing the hand-held unit, TI went on to incorporate the technology into a speech synthesis peripheral for its TI 99/4 computer. TI has done more research and devel-

tract. TI's new speech synthesizer strings together a series of allophones (a subset of phonemes, the most flexible building blocks in speech construction) to come up with a text-to-speech device that gives you a virtually unlimited vocabulary. The speech synthesizer (\$150) along with a speech editor (\$44.95) and a command module that plugs into the TI 99/4 personal computer, allows you to program speech into your own program and offers a word selection list of approximately 375 words.

TI is also incorporating this allophone technology into their new Terminal Emulator II. This unit makes it possible for the computer to read aloud what is written on the terminal screen. The user simply

it read that text. A third option is to have the computer read the information that is transmitted via a data base service. The price for this product is \$49.95.

Increasing efficiency

With two evaluation vehicles in the market now, a complete board, the DT-1000 (\$495) and a chip set (\$85), National Semiconductor is trying to make it economical to use speech synthesis technology. The DT-1000 is a self-contained board with a microprocessor, keyboard, speech synthesizer and speech ROMs containing about 140 individual words. With a fixed set of words, this product allows the customer to evaluate the marketability of the product or perhaps tie these words into some kind of an end product for prototype purposes. The chip set contains the speech synthesizer and the two speech ROMs with the same vocabulary as the DT-1000.

National Semiconductor also sells custom speech capability, which is anything that is not contained on the DT-1000. The customer brings the company a list of words, specifies the voice he would like to speak those words and National gives him back a set of hardware that allows him to build it into the end product.

The talking Apple

The Echo II, a plug in card for the Apple has a software based phoneme set that allows the user to put together any word or phrase for the computer to say. The phonemes

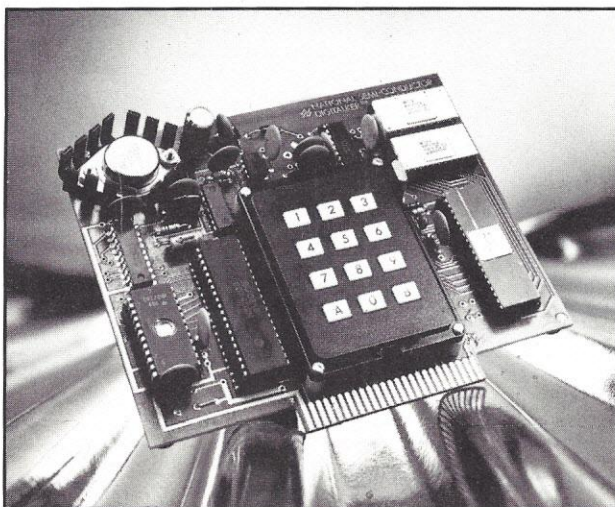
and subroutines to interface with the chip are all in a 1K machine language program that has to be loaded in and takes only ten to 20 bytes per word, depending on how long the word is and how many syllables it has. Echo II uses strictly male speech now but a female voice is scheduled to be released this month. This unit, at \$225, comes with the interface card which has an on-board audio amplifier, speaker, connecting cable, disk and manual.

To be released in June, also part of the Echo series, are two general purpose models designated Echo GP. One model will have a serial interface and the other a parallel interface, but both will contain their own on-board 6502 microprocessor and will be stand-alone peripherals. At press time, prices for these units had not been determined. Street Electronics is also working on TRS-80 and S-100 versions, according to Milo Street, president.

Another speech peripheral for the Apple II computer is the Super-Talker, a speech digitizer, from Mountain Computer, "Ours is not pre-programmed with a machine-type voice. It's more analogous to a tape recorder in the sense that you record your own voice into the microphone that comes with the machine, and actually store your own phrases," said Bill Schlosser.

Super-Talker also includes example programs

continued on page 35



National Semiconductor's DT-1000 speech evaluation board contains about 140 words.

opment in the speech synthesis area and uses a technique called Linear Predictive Coding (LPC), which attempts to simulate the human vocal

types in a phrase, enters it and the computer will speak that phrase. You can also type in a page or more of text and then, as part of a program, have

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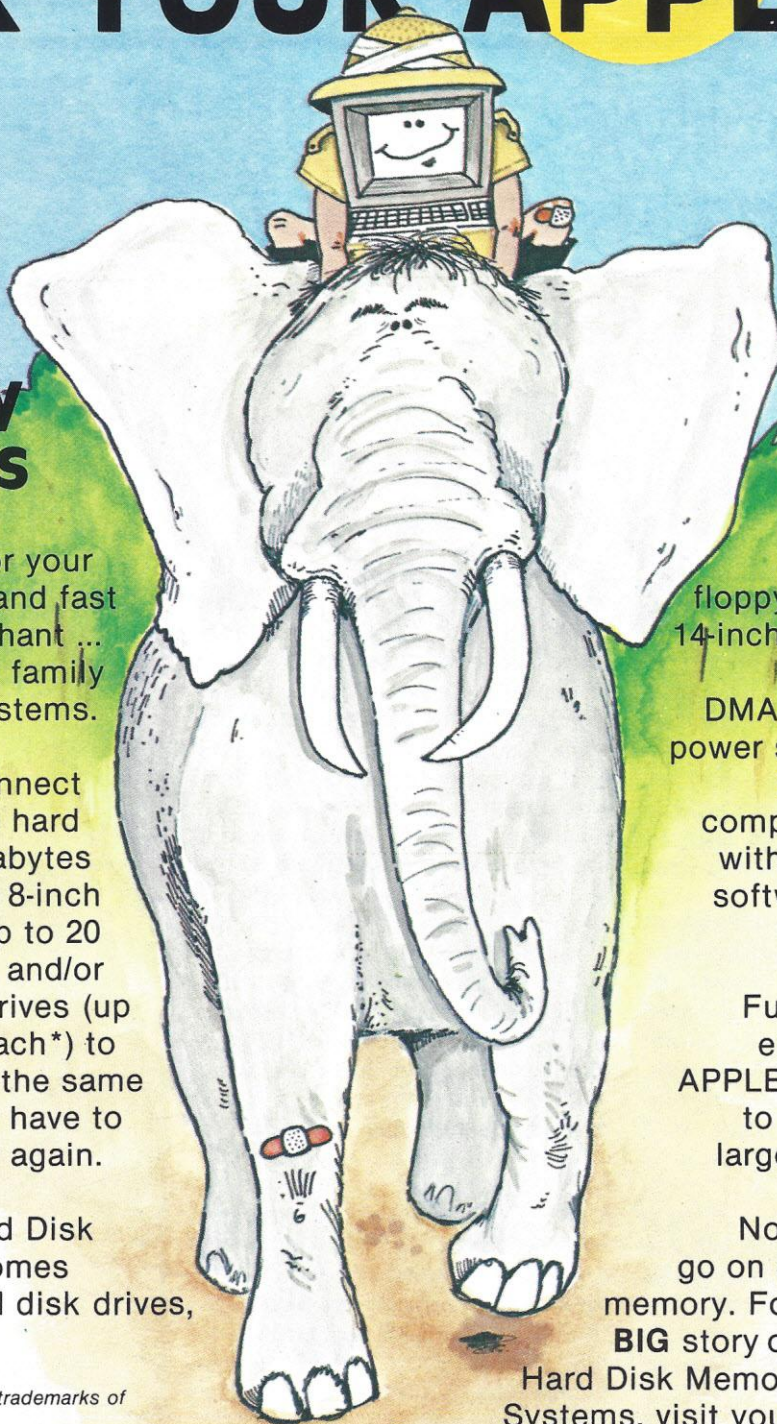
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Financial Modeling Software: Tools for the Overworked Manager

For years, financial analysts and economists have used mainframes and expensive time-sharing systems to predict corporate and national economic performance. Financial modeling—a partial simulation of real or possible situations—has assumed an aura of the mysterious to small-business owners and even financial executives for medium-sized and major corporations.

But those days are numbered, as are the days of the \$30,000-a-year time-sharing systems. Modern financial modeling tools, high-speed computers and sophisticated software are within reach of small businesses. Relatively inexpensive personal computers and personal software, with great power and sophistication, have arrived.

More than 15 programs, ranging in price from \$79.95 to \$1500, perform basic financial modeling and analysis tasks on either Apple IIs and IIIs, Radio Shack TRS-80 models, CP/M-based Z-80 or 8080 micros, or Vector Graphic systems. Of course, the programs' power and capabilities vary with cost, but business owners or financial managers—from women who sell cosmetics through parties in their homes to VPs of finance for General Motors—can find personal computer software that will let them

perform financial modeling at a fraction of the cost of any larger system.

The software is friendly, with features that only 24 months ago could be found only in timesharing systems or very expensive minicomputer software. And, belatedly, most vendors have recognized the demand for documentation and manuals that teach the buyer, whether experienced or not, how to put the software to effective use so the huge potential for time and money savings can be realized.

But the average buyer must beware; the best modeling software is difficult for professionals to tackle; so small-business owners and employees and novices would do best to start with inexpensive programs.

A look ahead and behind

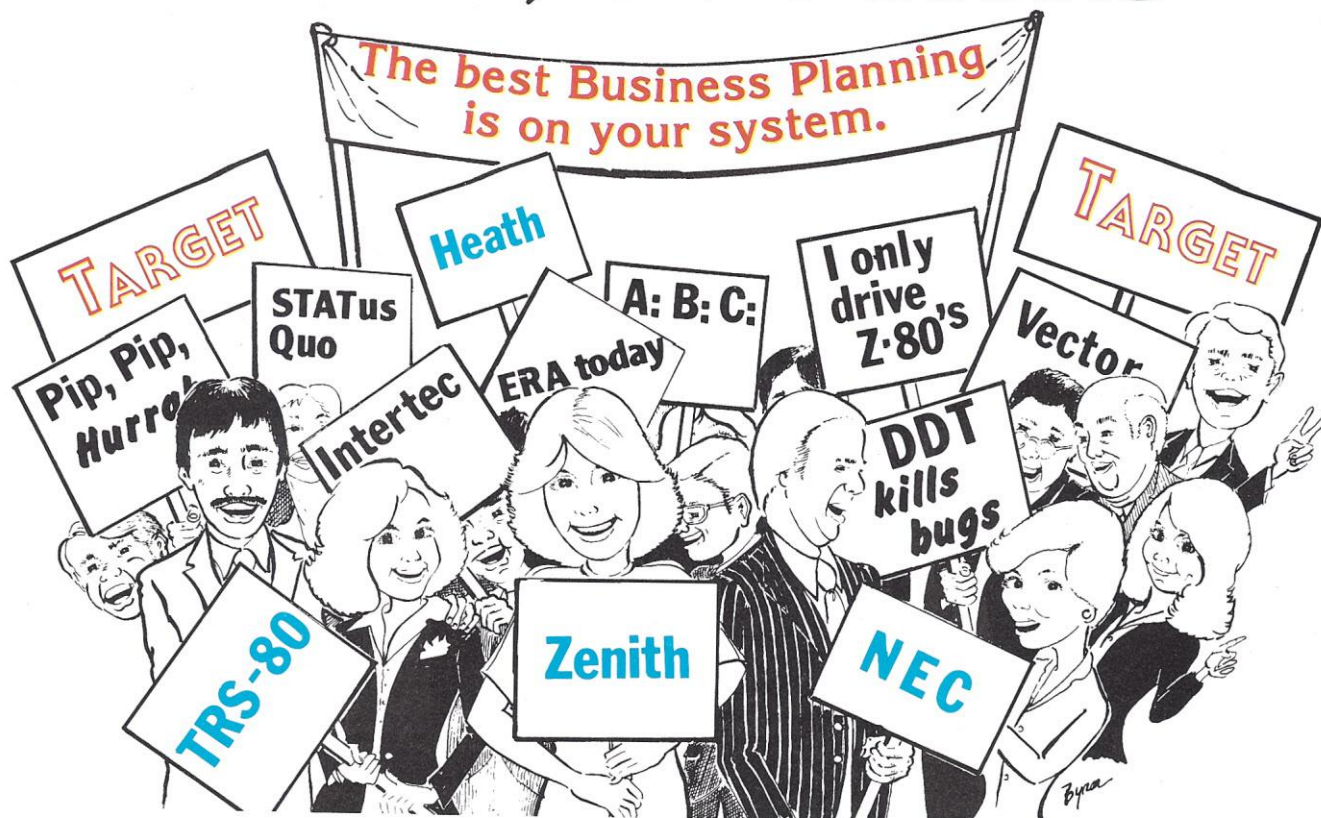
What is financial modeling software? Simply put, a model of any kind is a small copy of a real thing. A model of a boat can be anything from a piece of flat wood and a stick for a mast to a motorized version of a battleship; a financial model can encompass a few aspects of a company's financial situation or every one of thousands of line accounts from every department of a major corporation.

In business, says John Crawford, author of MINIMODEL, a sophisticated financial modeling package, "modeling is a tool which allows the planner to simulate the future on





STAND UP, CP/M USERS



For the past few months you have patiently endured the indignity of watching your friends show off their flashy visible number cruncher on their game-playing computer and longed for something as slick.

You seriously considered buying *their* computer, but you just couldn't give up the benefits of the CP/M operating system.

Well, say hello to TARGET™, the best business planning system available on micros today (and some big computers besides).

Talk about a blank ledger sheet or columnar tabulator! TARGET™ is much more than that. Sure, just like their product, you can fill in the rows and columns as you see fit and the numbers will whiz by you on the screen. But, we let you create your report in English, not in some combination of reverse Polish notation and algebraic matrix languages.

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LINE 3 NET = SALES - EXP
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EXP 50 + B2*1.15 + C2*1 + D2*1.15
NET + B1-B2 + C1-C2 + D1-D2 + E1-E2
```

At least, that is what their product might look like if you could see all of your data and calculation rules at the same time, *which you can't*. If you think that it is an easy approach for debugging, guess again.

TARGET™ displays a full screen of results or data and calculation rules at your command. And, it runs on your system. How much more could you ask?

Lots! And TARGET™ delivers. We give you the ability to:

- Obtain hard copy printouts of *both* the results *and* your set of data and calculation rules used to create those results.

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TRS-80 is a trademark of Tandy Corporation.

- Write the results of data and calculation rules to the disk as formatted files for word processing.
- Use full conditionals (IF . . . THEN . . . ELSE) in your set of rules and stack conditionals within conditionals.
- Build powerful models with commands such as GROW, MIN, MAX, AVE, CUM, GREATER, LESSER, SUM.
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paper—it facilitates the evaluation of future actions and provides quantitative estimates without waiting for the events themselves to occur." Computerized financial models let businessmen consider, very quickly and in detail, the possible effects of potential actions. Models do this through mathematical equations, which obviously can easily be drafted as a computer program or a set of rules that a computer can process.

But financial models can also be used to look backward and analyze a company's past performances. They can help managers discover where problems occurred.

What are some of the financial models that owners and managers will find useful? A partial list includes:

- Cash flow forecasting and analysis.
- Budget planning and consolidation.
- Sales planning and forecasting.
- Material and labor requirements planning.
- Acquisition and merger analysis.

The list can go on until every aspect of a company's financial life is covered.

A Time-sharing background

Financial modeling did not come into its own until the mid-1960s when mainframe computers came out of the laboratories and into the offices of corporate and financial institutions. Before then, financial modeling had been a laborious and little used pencil-and-paper procedure that required hordes of accountants.

By the mid-70s minicomputers had assumed some of the role of corporate financial planning. But even more popular were the time-sharing systems that gave a corporate or institutional financial analyst access to mainframe computer power at what was then a fraction of a mainframe's operating cost. Today more than 25 major time-shared financial modeling packages are available, according to Real Decisions, a consulting firm that evaluates the alternatives available to users of information processing services. The Stamford,

Conn., firm recently published an evaluation of 27 financial modeling packages available through time-sharing services.

Although all of these time-sharing packages are very sophisticated, and many provide links to various enormous data bases, they are very expensive. According to Real Decisions, the connect fees above range from a minimum of \$3.50 per hour (during other than prime time) to \$17.50. Add to that the costs for storing characters (calculated in storage units of 1,000 characters a month), and the costs range from \$1,000 a month to store as many as 25 million characters to \$750 a month to store only 1 million characters.

Large corporations and banks have no trouble at all in accumulating monthly time-sharing bills of \$10,000 to \$30,000. Even small or

systems is \$3,000 to \$7,500. As financial analysts are quickly discovering, the payback for micro-based financial modeling programs is extraordinarily fast.

Expect some limitations

The less expensive micro-based programs do not have the power or sophistication of a time-shared system or RCS, FPL and MINIMODEL, but they can be as useful to a small business as the others are to major corporations. They range from Hayden's FINPLAN, designed specifically for small-business budgeting and planning, for \$79.95, to \$299 for Radio Shack's most sophisticated version of VisiCalc, marketed by Personal Software. In between are a dozen programs of varying cost and sophistication. As with most computer software, however, the cost does not necessarily reflect the package's

The average buyer must beware; the best modeling software is difficult for professionals to tackle; so novices would do best to start with inexpensive programs.

medium-sized institutions that must have these systems can accumulate bills in the thousands of dollars each month. And these fees do not include additional service charges, such as minimums.

Big savings with micros

Compare these with one-time costs (and relatively low monthly maintenance fees) for micro-computer-based packages. The best three financial modeling packages for microcomputers are based on time-shared financial packages, and they cost, respectively, \$495, \$695 and \$1,500.

The most expensive, RCS from Ferox Microsystems, runs on a 64K RAM Apple II Plus with three disk drives, while the least expensive, MINIMODEL, runs on any 48K CP/M-based system with two disk drives. In between is FPL (A Financial Planning Language), marketed by Lifeboat Associates, which runs on any 48K RAM, CP/M-based system.

The hardware configuration for the Apple comes to \$4,000 while the same cost for the two CP/M-based

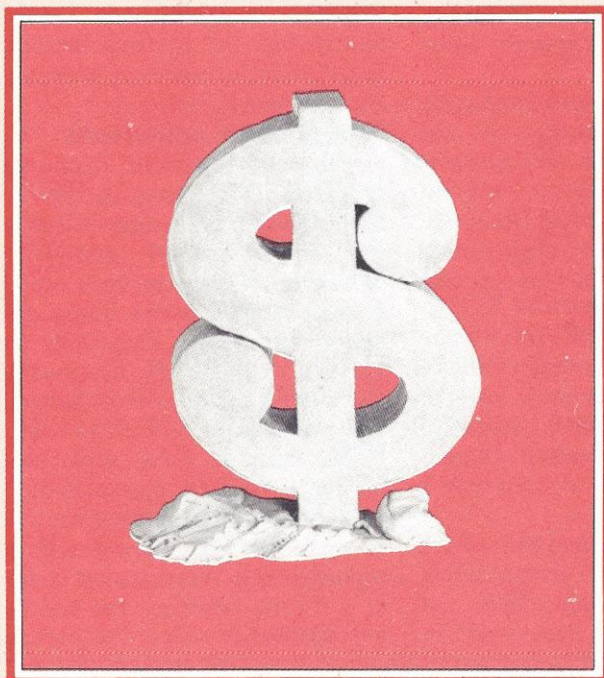
usefulness.

Although the three best micro-based financial modelers have practically as many functions as their time-sharing parents—and sometimes more—they are more limited in several ways.

First, each has size limits (although they're very wide) to the models they will process. For example, the RCS "work area" is limited to 1,919 "cells," or intersections of rows and columns. You can define rows and columns any way you like—10 columns and 191 rows, 50 columns and 38 rows, and so forth. On the other hand, MINIMODEL is limited only to the capacity of the mass storage device.

Second, they cannot hook up to or take information from outside data bases. Most of the time-sharing services offer data bases that corporate, governmental, university and research financial planners need.

Third, at this time none of the micro-based modeling packages integrate with other software, such as accounting packages, so all data must be re-entered into the model. Ad-



10 Steps To Building A Financial Model

Before anyone can construct a model of a business situation, he or she must have a good idea of what that situation actually is and be able to translate it into mathematical expressions. That is not as hard as it seems. Most people do it informally at home when they determine a simple model of their annual budget, whether it is put into a computer, written on scrap paper or kept in their head. Budget projections during the year are a model of the future.

How do you build a financial model? The following 10-step procedure was gleaned from the RCS tutorial manual, the MINIMODEL manual and the Vector Graphic EXECUPLAN manual.

1. Determine what type of business activities you want to model. Start simply, with summaries of sales and expenses, perhaps. Modeling requires a lot of practice to make perfect. All of the software has been written to help you learn from the bottom up. But, above all, be sure you have thoroughly analysed and understand the business activities you are going to model.
2. Draw up the reports you want on paper. This may be as simple as filling in the blanks of your company's existing business forms. Although you may find that the package you purchased will not accommodate the existing forms perfectly, most modeling software is flexible and lets you create your own reports according to formats you choose. Often you can find simple for-

mat for most common reports in accounting reference books in a business library. Be as specific as possible about the locations of dollar signs, commas, decimal places and text, and study how your package inserts all of these into the model.

3. Establish the "logic"—the formulas you must use to calculate the changes in business activities. Insert these formulas into the proper places in your written reports. Then insert them into the modeling package at the appropriate locations. RCS, for example, gives each item, such as PROFIT, a row number and a name, and it defines calculations in terms of row numbers. A typical example: $\text{COST OF SALES} = 2-6$ (row 2 minus row 6).

4. Insert the report specifications into the model, taking each line from the form, with its model line number and logic. Type each line into the matrix at the proper location. For row names and formulas, this is usually the first column.

6. Gather and type in test data, remembering to use the package's formulas and conventions—such as repeating the same value across all columns—to make the entry more efficient. Put data in all of the columns you wish to test.

7. Calculate the results both on paper and in the computer and compare the results. If the results don't match, check for errors in the report specifications, data entry or logic operations. If you did it right the first time, take a break and congratulate yourself.

8. Test various alternatives with "what if" questions, changing numbers, constants and variables. Determine the critical factors and variables and judge their effects on your model. Become more familiar with the various functions and commands available and use them in your tests.

9. Print out samples of your reports and alternatives, then stop, evaluate and edit your model. In short, clean it up, revising what you have done. If necessary, go into a "loop"—tear the first one up and start again.

10. When the basic model pleases you, begin to add more features and gradually expand the scope of the model. Go slowly and test carefully as you expand. When you're finished, pat yourself on the back, take the family out to dinner and when you finish start your second model.

But don't forget that a model is not a static thing. It should come alive as you change it to meet new conditions, test new concepts and examine new strategies. A model that is written once and shelved is of no use. John Crawford, who wrote MINIMODEL, says that a model's value lies in permitting managers to evaluate any action and eliminate the drudgery involved, so managers can make better decisions. And that's the whole idea: financial modeling with microcomputers is the newest way modern businesses can improve their decision-making.

vanced Management Strategies Inc. (AMSI) says it is working on five additional business planning system modules for its TARGET program, including statistical and business analyzers, a graphics package, a report processor and a trademarked WHATiF package. RCS, however, already includes excellent simple graphics and report generators, and it performs many statistical operations.

And, fourth, the time-sharing data bases respond to user input more quickly. But because that time difference is measured in seconds or a few minutes, many financial experts are willing to make the trade in favor of the personal computer packages.

A chance to explore

Of prime importance is a manager's ability to examine as many alternatives and ask as many "what if" questions as he or she desires. Time-sharing users have long complained that they cannot make changes or examine different strategies because they would cause prohibitively high time-sharing bills. Personal computers on desk tops, however, let the users make as many changes and examine as many different choices as they want, thereby increasing the information on which to base decisions.

Office productivity can be improved. Many managers use their financial modeling experience to set up permanent models and then teach their administrative staffs to use, run and print the models. This saves the managers their most valuable commodity, time. In contrast, time-sharing systems require a professional's personal attention at all times.

Three modeler categories

The micro-based financial modelers can be divided into three categories according to their features and limitations. But despite their different terminologies, all are based on the intersections of rows and columns within electronic spread sheets, and they perform calculations using formulas, or "rules," inserted into row and column intersections.

In the top category are the three that are most similar to time-sharing modeling systems: RCS, FPL and

15 Questions To Ask About Financial Modeling Software

The following 15 questions are suggested as points from which you can begin your search for the best financial modeling program for your situation. Take this Q&A with you when you visit a computer store, or use it as a reference when you write for information about individual programs.

1. How sophisticated should your financial modeling package be? Do you plan to use it inside a corporate department or executive office, to replace a time-sharing modeling system, or to add it to a small business' operations?
2. What type of calculations do you require? Arithmetic only? Arithmetic and trigonometric? Arithmetic and financial functions? Or all of them?
3. How many columns and rows—maximum—will you need for your largest model? Include time periods as columns and account lines as rows.
4. How easily does the package perform sensitivity analyses and answer "what if" questions? What methods does a package use to perform them? Simple changes of data or constants? Altered model assumptions? Built-in commands or rules? Or some other way?
5. On what type of logic structure is the package based? Simple rows, columns and rules? Programming-like language structure? Or uncommon approaches?
6. Are the reports and their formats specified for you, or can you establish your own report formats for each model?
7. Does the package include a report generator with multiple features and flexible formats? How are formal reports printed? How flexible are the printing formats? Can you print partial or summary reports?
8. Can you move rows, columns and "cells" within a model and from one model to another?
9. Does the package consolidate various models? If it does, how many rows, columns, cells or complete models can be consolidated at a time, and how is this procedure carried out?
10. If your model is too large for the largest available file, can you break up the model into logical modules? Can you create separate models that can be treated as subsets of a larger model, with their results consolidated into one summary report?
11. How important are graphs to your models? If they are essential, what type of graph—pie, bar chart, line graph or histogram—would be best to use? How does the package produce graphs?
12. Does the package include a text editor? Is it screen-orientated or line-oriented, and how many functions does it perform, and how does it carry them out?
13. What personal computer configuration does the package require? How does its cost compare with the cost of other configurations required for other financial modeling packages?
14. How do the features, functions and costs of other packages compare with those of the one under consideration?
15. Is the manual well written? Can you understand its language and grasp its intent with just a cursory review? Does it provide easily grasped examples and sample models?

RCS Replaces Time-Sharing System and Saves Money

Do financial modeling programs for micros really do the job? One user of the most sophisticated modeler thinks so. Christopher Dunford, assistant vice president of the First American Bank of Maryland in Silver Spring, has used RCS for more than six months and sings the program's praises as a "terrific" investment that has already had "a very definite financial benefit."

Dunford has replaced a standard time-sharing modeling package offered by COMSHARE, but he still uses the time-sharing system for other functions.

"We use RCS for complicated assets and liabilities trend projections," he says, "but the biggest job is for profit estimates based on a summary of our general ledger for a given year. It includes all line accounts, yield and ratio sections, and liabilities. The model we have made has two sections, each with a total of 300 line items."

Asked if RCS was faster than his time-sharing system, Dunford said that in execution and printing, it was a little slower. But he added: "RCS is a real time-saver in two ways: I can go back and change the data, and I can change the logic."

Beyond these number-crunching functions, the biggest advantage of RCS is its reporting capability, Dunford says, observing: "It's very easy to change report parameters with RCS. We could change time-sharing report formats or build new ones, but it was very costly, so we rarely bothered to do it or run them again."

But he says RCS or any sophisticated modeler takes some getting used to; it is more complicated than a simple programming language. He adds that Ferox Microsystems was very supportive, helping him design and install his initial applications. Since then, the company has continued to help him establish new models, and Ferox issues updates continuously as its experience with RCS grows.

MINIMODEL. These are followed by VisiCalc and all of its recent incarnations; Apple Computer's Decision Evaluator system (using VisiCalc, Desktop/PLAN and ApplePLOT; Apple ///'s Information Analyst (basically VisiCalc III and Business BASIC); AMSI's TARGET; Peter Roizen's and Lifeboat's T-MAKER; Ohio Scientific's PLANNER PLUS; and Vector Graphic's EXECUPLAN.

In the third category are REPORT WRITER from Carolina Business Computers Inc.; Electronics Technology's COL-U-PAD; Hayden's FINPLAN; and Spectrum Software's Universal Computing and Business Machines.

Third Category Features. Al-

though each program in this category differs in specifics, they have these features in common:

- Arithmetic functions—limited to addition, multiplication, subtraction, division and one or two more features, such as percentages.
- Simple, standard reports—limited to printouts of the format of the work sheet as it appears on the screen.
- Edited, English-like calculations. For example, a formula could be "Sales Revenues - Expenses = Gross Profits," instead of "Row 1 - Row 2 = Row 3."
- Flexible form and document design. This allows a user to create any type of financial statement he or she chooses.

- An internal calculator that automatically "cascades" or "replicates" the results of changes throughout a spreadsheet. This feature was popularized by VisiCalc but has been adopted by most of its competitors.

- Programmability, in that a formula can be inserted at any location within the grid and permanently stored.

- An ability to perform at least simple "what if" sensitivity analyses.

- An ability to insert constants into "cells" or intersections and formulas.

- Simple editing features, such as adding and deleting rows or columns.

Additional features that are found in the third category, but that are more common in the second, are:

- Col-U-Pad's trigonometric functions and its merge function, to merge rows or columns from one work sheet with another.

- The Universal Computing Machine's "jump" command, which goes from one work pad to another, and a copy function, which reproduces the contents of a row or column into one or more rows or columns.

- REPORT WRITER's special text editing features and operators.

- FINPLAN's use of accepted business forms and "handholding" procedures for small-business owners.

Second Category Features. VisiCalc sets the pattern for these packages, but software authors have extended their features in many ways:

- Statements that perform frequently used groups of operations with a single command, as in TARGET.

- Backward "iterations" of financial formulas.

- Statistical functions.

- Trigonometric mathematics.

- Exponentiation.

- Conditional and logic statements, such as IF-THEN and IF-THEN-ELSE logic, with up to six conditionals: greater than, less than, equal to, not equal to, and so forth.

- Use of parenthetical expressions within line statements.

- "Grow" functions that take an initial value and increase it by an indi-

continued on page 59

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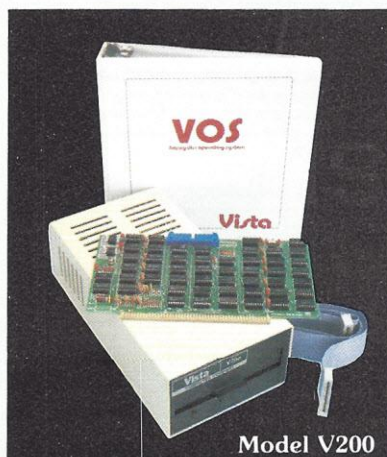
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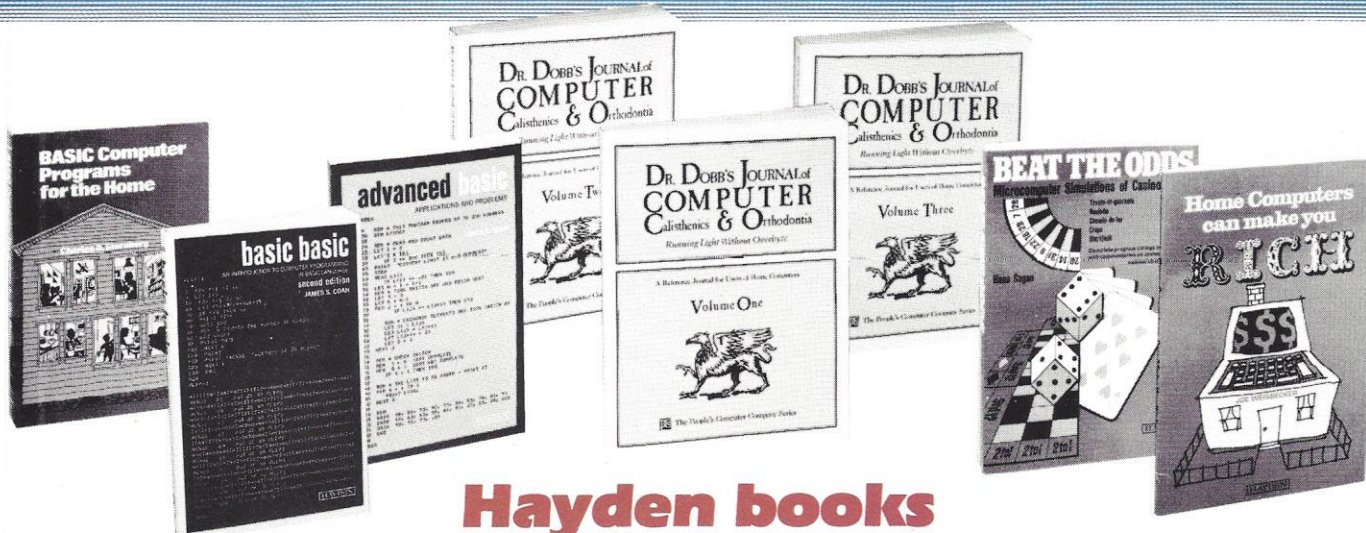
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LEISURE COMPUTING

Calorie Crunching With A Computer

As a general practitioner, I encounter many patients who are overweight. When they switch from chocolate bars and potato chips to bran muffins and salads, not only do they lose weight, but they also look and feel healthier, with good-looking skin, shiny hair and a better overall appearance. In addition they are able to work longer and play harder.

In essence, a balanced diet designed to your needs helps you enjoy life to the fullest. A computer program can help you design such a diet in two ways:

1. By determining your ideal body weight, or goal weight, based on your age, sex and body build.
2. By using this weight to figure the number of calories you need to lose approximately one and a half

to two pounds a week, if you are overweight.

Entering the data

To follow the program, consider Jane Doe and her husband, John Doe. Jane is 35 years old, 5 feet 5 inches tall and engages in moderate activity including housework and part-time work at a day-care center. She is of medium build, and her ideal body weight works out to 57.29 kilograms, or approximately 126 pounds. Her goal weight is 120 pounds. The program will calculate the calories she needs to attain the goal.

Since there are a finite number of diet possibilities in the program, the closest one—the 1,500-calorie diet—is produced. The printed material is divided into two sections by asterisks. The part between the asterisks is designed for doctors, to be cut from the page for insertion into the

patient's chart. The diet itself goes to the patient.

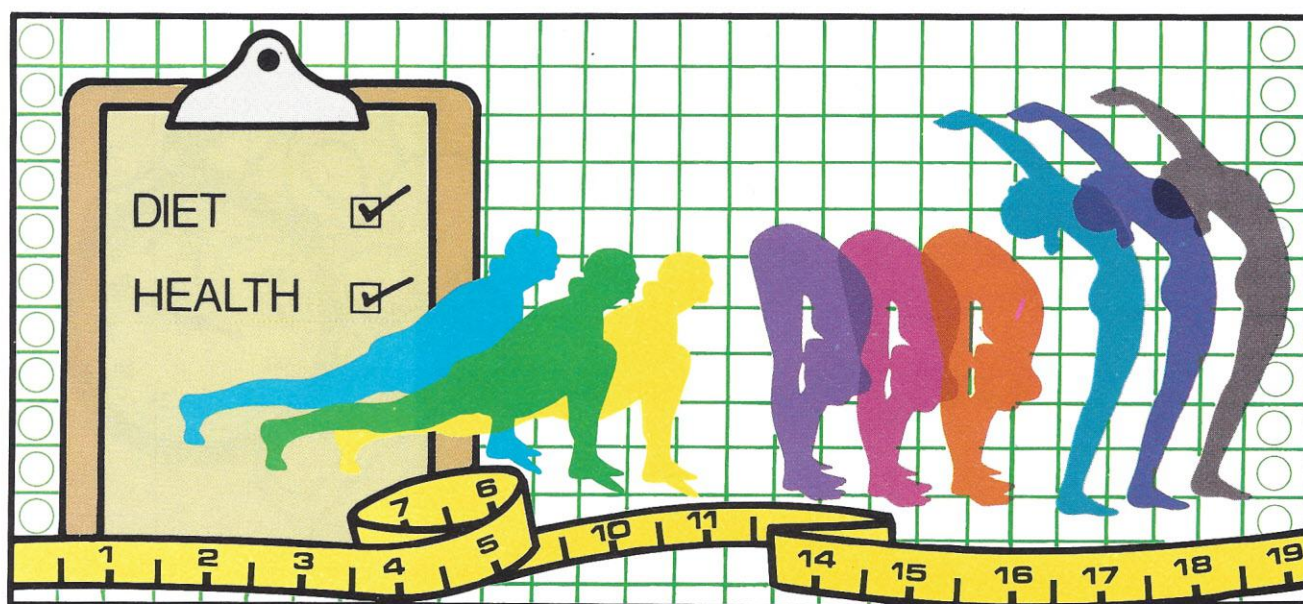
John Doe is 40, 6 feet tall, and weighs 290 pounds. He is of medium build but very inactive. He drives to work, takes an elevator to his office on the third floor and sits behind a desk at work. He engages in no sports, but enjoys watching them.

John's goal weight is 78.88 kilograms, or 174 pounds. John would like to weigh 180 pounds, which is reasonably close to the computer's goal weight.

Using 180 pounds as the goal weight, the computer selects a 1,900-calorie diet. With this new diet, John also plans to become more active. He'll take long walks with his wife and their dog on Saturdays and play some racquetball.

Converting to pounds

In using the first part of the pro-



DENISE BARBER

gram, you will find it easy enough to convert to pounds, if you wish, by multiplying all the kilogram (kg) weights by 2.2. The program itself can also be changed to print out the weights in pounds.

The diets themselves have been patterned after American Heart Association recommendations for 50 percent of the calories from carbohydrates, 20 percent from protein and 30 percent from fat. This differs from the usual North American diet, which contains 40 to 45 percent of fat calories. By reducing this fat intake to 30 percent, you will find it much easier to control your weight, since one gram of carbohydrate or protein yields nine calories.

This is not to say that fats should be totally eliminated from the diet. Fats are a necessary source of energy. Excessive fats, however, are stored in the tissues or silted in the form of cholesterol along the walls of the arteries. This silting along the blood vessels that carry food and oxygen to all body tissues contributes to the health problem commonly known as atherosclerosis, or hardening of the arteries. And that, it has been suggested, is a major contributor to heart disease, senility and high blood pressure.

These diets are based on the reduction of food intake; therefore it is most important that high "quality"

foods, rather than high "calorie," be chosen. In the case of breads and similar starches, select whole-grain products, such as whole-wheat breads and noodles, rye bread, oatmeal and bran muffins. Sugared cereals should be replaced by cooked or dry cereals from unprocessed grains.

The change from refined products also increases the amount of fiber in the diet, an important and necessary change, since the reduction in food intake could otherwise lead to constipation.

Balanced and varied diet

The essence of the eating plan is to look at a balanced and varied diet of "so many" servings, or portions, of food each day, rather than calories. A glance at the diets for Jane and John Doe shows that food portions are mentioned.

For example, Jane's breakfast allows her one portion of fruit. One fruit portion could be one-half of a medium apple, one-half of a small grapefruit or one medium orange. If she feels particularly hungry, she should not choose apple juice, as she is only allowed one-third of a cup. Rather, cooked rhubarb would be a good choice that morning, since she is allowed one full cup.

In the same way, Jane could choose to have two Shredded Wheat biscuits (2 "bread" portions) with

one-half cup of skim milk (one "milk" portion). By having skim milk with her cereal Jane is allowed an extra one-half fat serving. She uses this extra fat serving to have one egg fried in one and one-half teaspoons of butter or margarine. Jane could just as well have chosen three medium-crisp bacon slices, which would have covered both the fat and meat portions for that meal.

As an alternative to the cereal with milk, Jane could have chosen two slices of whole wheat bread, toasted, as a "bread" portion. In this case she would be obliged to drink her one-half cup of skim milk and use one and a half teaspoons of butter or margarine for the toast. If 2 percent milk is chosen, then the amount of butter allowed for the toast would be reduced to one teaspoon.

In the same way, lunch, dinner and the snacks can be arranged to accommodate one's likes and dislikes without sacrificing the diet. The instructions are guidelines only. This, or any other diet, should not be followed without the advice of your doctor.

This program was developed on a North Star computer with 32K of RAM, a Hazeltine terminal and Centronics printer. Special control characters were avoided, and thus it should easily be adaptable.

continued on page 100

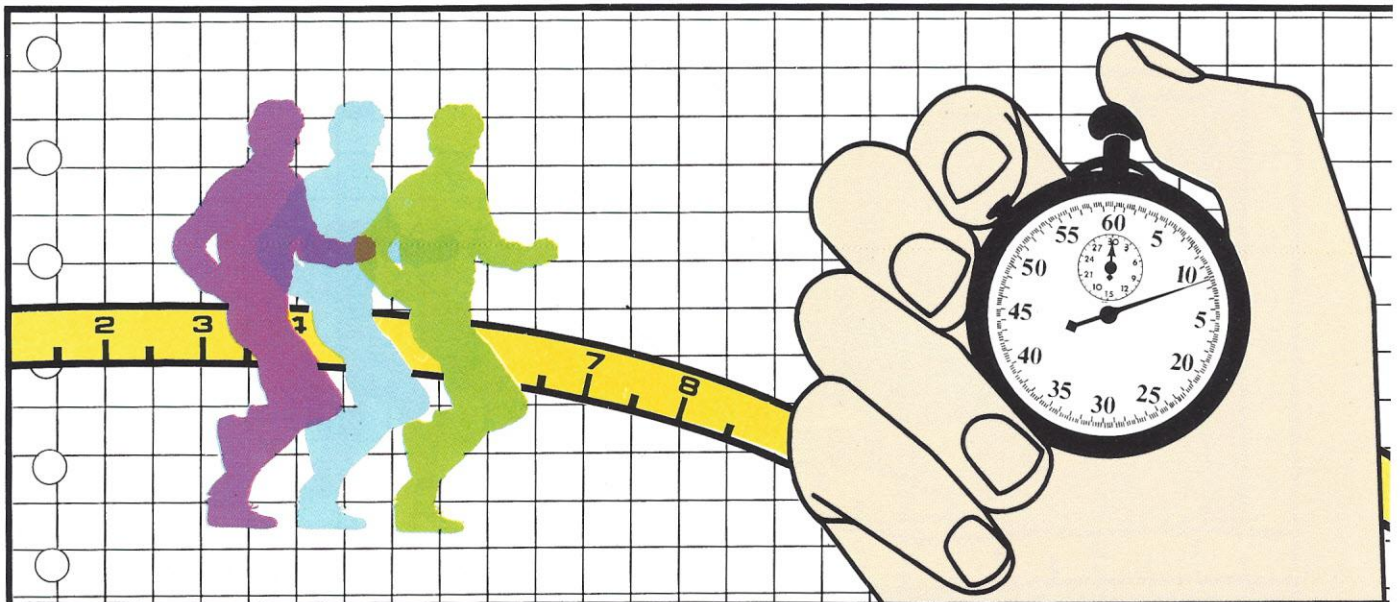


Table of Food Equivalents and Exchanges

ONE MILK SERVING EQUALS:

1/2 CUP OF:
2% milk
skim milk (add 1/2 fat exchange)
buttermilk

1/3 CUP OF:
plain yogurt

2 TABLESPOONS OF:
skim milk powder

ONE FAT SERVING EQUALS:

1 teaspoon butter or margarine
1 teaspoon cooking oil*
1 teaspoon mayonnaise
1 tablespoon French dressing

*Choose safflower, sunflower, corn, soybean, cottonseed or sesame

ONE MEAT SERVING EQUALS:

One 1-ounce portion, *cooked*
(3 inches by 2 inches by 1/4 inch thick) of:
BEEF, VEAL, LAMB, PORK, HAM,
POULTRY, LIVER, TONGUE, SEAFOOD
FISH
3 crisp slices bacon**
1 wiener (9 per pound)**
1 slice luncheon meat, 1/4 inch thick**
1 1/2 sausages (16 per pound)**
1 cube cheddar cheese (1 1/2" by 1" by 1")
or one slice (packaged)
1/2 cup cottage cheese
1 medium egg
2 tablespoons peanut butter (omit 2 fat
exchanges)**

**These items should be limited to once per week for
maximum weight loss

ONE BREAD SERVING EQUALS:

1/2 cup cooked cereal
3/4 cup dry cereal
1 shredded wheat biscuit
1/2 cup canned corn
1 cob of corn
1 small potato OR 1/2 cup mashed
1/2 cup macaroni, cooked
1/2 cup rice, spaghetti or
noodles, cooked
1 slice bread (plain or toasted),
whole wheat, rye, cracked wheat
or white

1/2 bagel
1/2 hamburger or weiner bun
4 rectangular OR round Melba toast
1-6 inch square Matzos
3 arrowroot biscuits
4 (2-inch square) Graham wafers
6 (2-inch square) soda biscuits

ONE FRUIT SERVING EQUALS:

ONE-HALF OF:
a medium apple
a small banana
a 5" cantaloupe
or melon
a small grapefruit

TWO:
medium apricots
medium plums
cooked prunes

1 CUP OF:
strawberries
cooked rhubarb
diced watermelon

ONE:
nectarine
medium orange
medium peach
small pear
tangerine

1/2 CUP OF:
applesauce
most berries
grapefruit juice
orange juice
grapes
crushed pineapple

OR
2 cups raw rhubarb
2 tablespoons
raisins
1/2 cup pineapple
juice
1/2 cup apple juice

ONE VEGETABLE A SERVING EQUALS:

ONE CUP OF:
canned tomatoes
tomato or vegetable
juice
canned sauerkraut

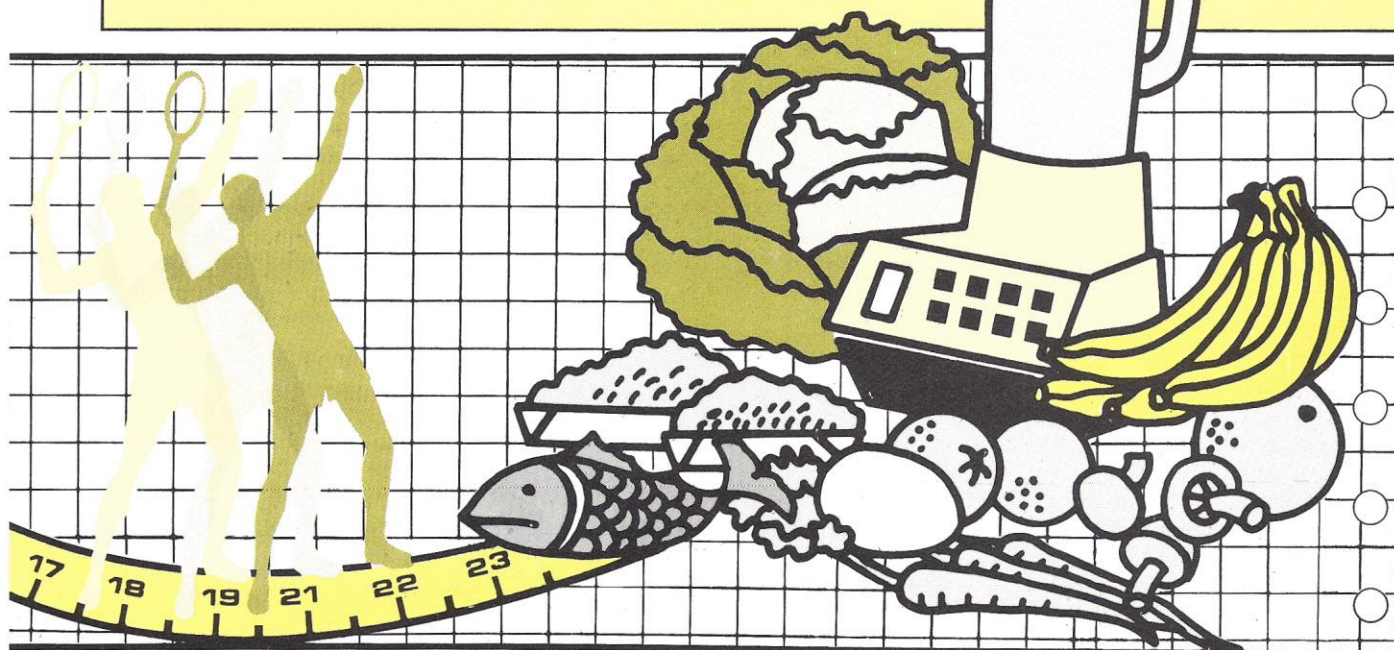
1/2 CUP OF:
beets, canned
broccoli, cooked
raw or cooked
carrots
mixed vegetables
onions, chopped
parsnips
squash
turnip, cooked

ONE VEGETABLE B SERVING EQUALS:

"What you would like of" mushrooms
beans, yellow or green green onions
bean sprouts pepper, green, raw
lettuce or cooked
cabbage, raw or cooked radish
celery, raw or cooked spinach
cucumber zucchini

FREE FOODS

clear broth
onion soup
1 tablespoon
ketchup
chili sauce
coffee OR tea
cranberries
extracts
gelatin,
unsweetened
lemon juice
mustard
(1 tablespoon)
pickles, sour
spices
vinegar





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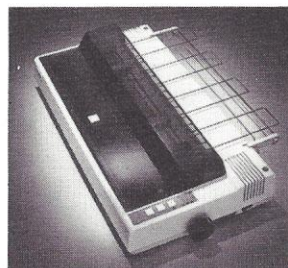
The MX-100 is a printer that must be seen to be believed. For starters, we built in unmatched correspondence quality printing, and an ultra-high resolution bit image graphics capability. Then we added the ability to print up to 233 columns of information on 15" wide paper to give you the most incredible spread sheets you're ever likely to see. Finally, we topped it all off with *both* a satin-smooth friction feed platen *and* fully adjustable, removable tractors. And the list of standard features goes on and on and on.

Needless to say, the specs on this machine — and especially at under \$1000 — are practically unbelievable. But there's something about the MX-100 that goes far

beyond just the specs; something about the way it all comes together, the attention to detail, the fit, the feel. Mere words fail us. But when you see an MX-100, you'll know what we mean.

All in all, the MX-100 is the most remarkable printer we've ever built. Which creates rather a large problem for those of us at Epson.

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CIRCLE 12

continued from page 20

such as Talking Math and Accents. The math program shows you, verbally and graphically, a math problem and tells you whether you have solved it correctly. Accents teaches you German and French phrases and corrects pronunciation. This peripheral costs \$300.

Human-like

The Speech 1000 board from Telesensory Speech Systems, produces high-fidelity human-like speech with a stored fixed vocabulary. It uses a synthesis technique known as linear predictive coding (LPC) and is almost always sold with a custom word list for \$1200 plus vocabulary. It

stock stored vocabulary but has a more mechanical sound.

Male or female

The Electronic Components Division of Panasonic Company recently announced a voice synthesizer chip that can speak in either male or female voice and can synthesize up to 63 words in approximately 20 seconds.

Panasonic feels the chip will find wide usage in a variety of home electronic products including personal computers, home appliances and educational games.

TRS-80 speaks

Radio Shack's TRS-80 voice synthesizer adds



Radio Shack's Voice Synthesizer peripheral includes a built-in speaker and sells for \$399.

can store 300 to 540 words or 200 to 300 seconds of speech.

The Speech 1000 can replicate male or female voices in any language, the company said. According to Dave Gilblon, "it's probably as close to a tape recording as any synthetic speech product that you can get."

Telesensory also manufactures a Series III board that is priced at \$395. It has a 119-word

the capability of simulated speech, under program control to a TRS-80 Level I or II. It is ideal for computer-assisted instruction, the company said.

This peripheral includes a built-in speaker, volume control, pilot light and demo cassette. It is priced at \$399.

Talking software

Muse Software's The Voice requires a 48K Apple II or Apple II Plus

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- 2) Definable BAUD rates from 110 to 9600
- 3) Definable break (yes/no)
- 4) Allow line feeds
- 5) Commands:
 - a) Turn on RTS (request to send),
 - b) Turn off RTS,
 - c) Receive data only from terminal,
 - d) Receive data only from host,
 - e) Send data only to host,
 - f) Send data only to terminal,
 - g) Operate in dumb terminal mode,
 - h) Operate in ST80™ mode,
 - i) Check CTS status. (clear to send)

This is a self relocating subroutine that can load anywhere in high memory.

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NEWS

later referral and is extremely easy to edit, according to Jim Salmon. You can also make the Apple sing and produce sound effects with The Voice.

With Appletalker, a speech synthesis software package from Softape, the user can build tables of words that can be played back through the Apple's own speaker. This program requires a 16K Apple II with Integer BASIC and input is through the computer's cassette input port. Price is \$15.95.

Programma International also markets Talking Disk (\$19.95) for the Apple, which lets you create your own programs that talk. Talking Calculator (\$15.95), for the PET turns your computer into a calculator that talks.

Recognizing voice

Heuristics, Inc., a leader in the personal computer voice recognition field markets two series of speech peripherals for S-100 computers and the Apple II. The main Apple product is called the H-2000 Speech Link (\$259) which had a 64-word vocabulary and runs in Applesoft, Pascal or Integer BASIC. The Model 70 Controller, also for the Apple (\$85) can be used in conjunction with the Speech Link to control various devices by voice.

S-100 products include the Speech Lab which recognizes 32, 64 or 250 words. Prices range from \$299 to \$599.

Heuristics has also recently announced an expanded vocabulary fea-

ture, doubling the standard vocabulary on all of their commercial and industrial voice products from 64 to 128 words.

The TRS-80 VOX-BOX from Radio Shack allows you to use words and phrases to control and instruct your computer as well as enter data. The peripheral includes a push-to-talk microphone, machine language "driver" program and three application programs. It costs \$169.95.

Softape markets Apple-Lis'ner which allows you to build a table and input up to 31 words through the cassette input port. Each "word" can be up to five seconds long. The digitized words can then be appended to your own program. The Apple can then recognize these words when you speak into your recorder microphone. The price for this program is \$19.95.

What's in store?

"From an overall standpoint, speech is going to be a very rapidly growing market in this decade," said TI's Jim Muller. "TI has predicted that it will be a \$3 billion market by 1990. Where and how it is going to be used has yet to be really determined."

From General Instruments' point of view, Philip McLaughlin said that there are going to be easier ways to make code for some of the synthesis systems already available. "As the technology matures, systems will be designed that will enable low-volume users to

continued on page 86

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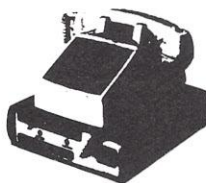
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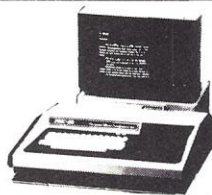
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SOLID STATE MEMORIES

Memories Are Made Of This

RAM, ROM, EPROM, EAROM, CCD and MBM . . . looks like a sea of letters staring at you from a bowl of alphabet soup. But they have meanings, and rather profound ones at that. They are abbreviations or acronyms for the all-important memory section of a computer.

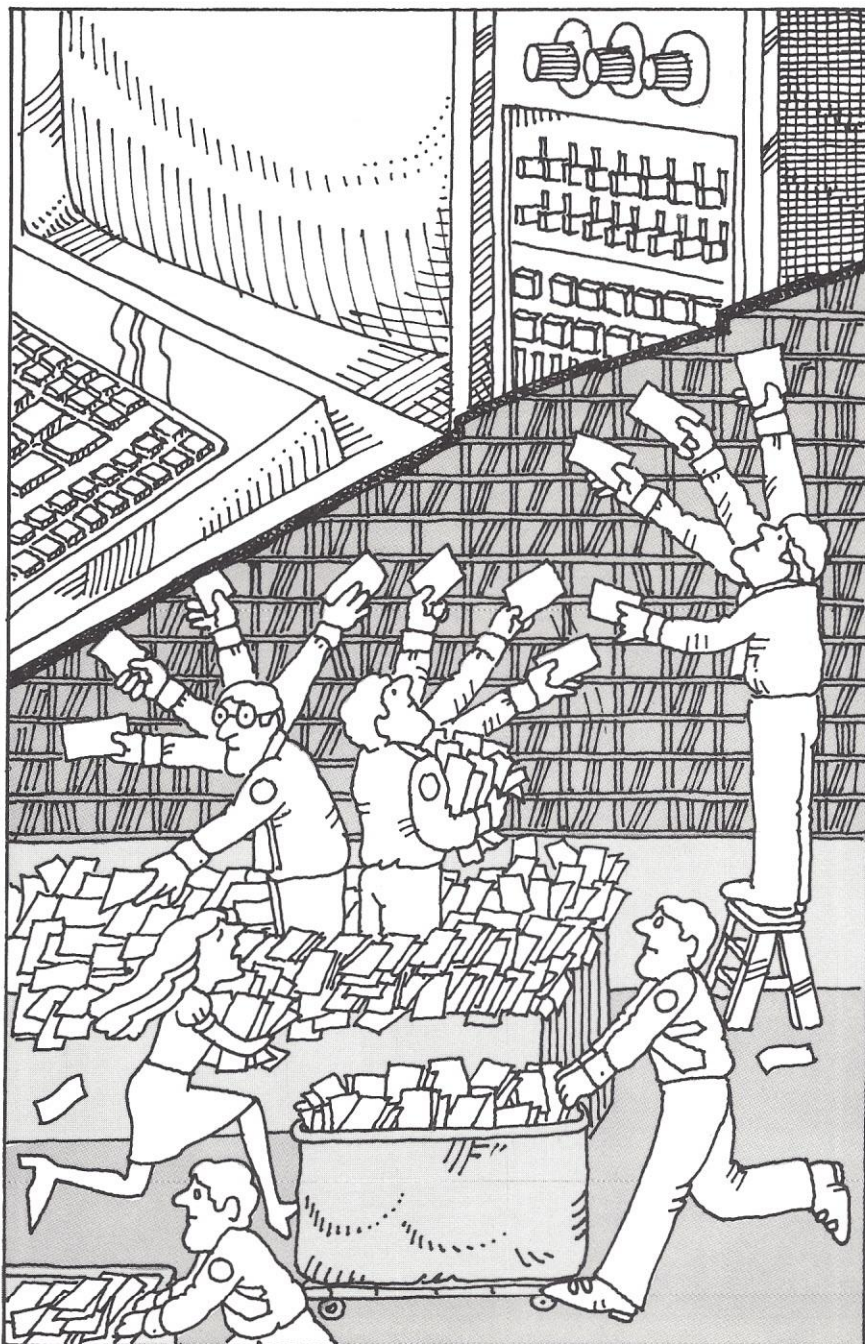
Information may be stored within the computer (resident memory) or externally (auxiliary mass storage). Storage may be in the form of electromagnetic devices, such as magnetic tapes or disks, or electronic, in the form of high-density semiconductor integrated circuits (ICs).

The function of the memory section in a computer is to store data and instructions. Most computer memories are semiconductor circuits, consisting of a large number of individual storage units or cells.

Basic semiconductor memory

Computer memories are required to store binary, not decimal, numbers; binary numbers are either 0 or 1, with each binary digit called a bit. When eight bits are handled at one time, the group of bits is referred to as a byte of information. Four bits, or half a byte, is known as a nibble. One byte is the equivalent of one alphanumeric character. Letters of the alphabet are represented by certain combinations of bits. These combinations are defined by the American Standard Code for Information Interchange (ASCII) which converts a binary combination of seven bits to represent letters of the alphabet; for example 1000001 represents A, 100010 represents B, etc.

The capacity of a memory system



FRANK MARCULIANO

SOLID STATE MEMORIES

is expressed in kilobytes or Ks, where a kilobyte is equal to 1024 bytes. Many personal computers are equipped with 16K to 64K of internal, or resident, memory. For some applications, additional memory is required and external or mass storage devices such as magnetic tape cassettes or disks are used.

A single silicon chip can contain thousands of individual storage cells to form a memory chip. Memory IC's are on the market with capacities ranging from 1024 to 65,536 cells. Each cell is capable of storing one bit.

The storage cells can be organized in various ways. For example, a 1024-bit memory can be structured as 1024 one-bit words or 256 four-bit words. A 16K-bit memory can be purchased as either a 16,384-by-1-bit, a 4096-by-4-bit or a 2048-by-8-bit memory. An 8-bit word is typical in most personal computers.

What's random-access?

Before taking a close look at the different memory types, let's take a quick run through most of the memory terminology that will be used in the rest of this article. For starters, just about every semiconductor memory used for storage can be

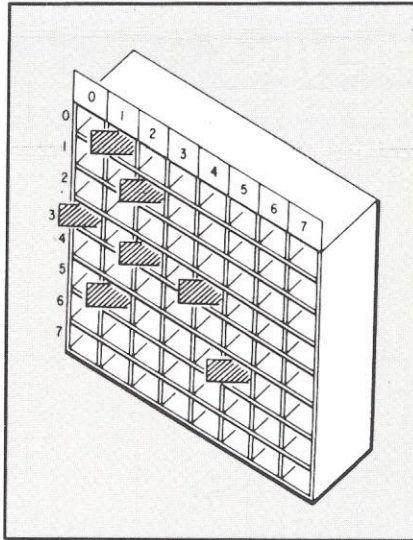


Fig. 1—The random access memory of a computer is very similar to this sorting bin set-up—any item can be retrieved just by knowing the row and column number.

called a random-access memory, or RAM, since the internal structure is such that it takes the same amount of time for the computer to reach any piece of information stored within the circuit. The arrangement of the memory can be likened to an array of post office boxes set up in a horizontal and vertical scheme as

shown in Fig. 1. By defining the row and column number, any box can be directly accessed, thus providing the sorter with the ability to randomly store or remove letters at each location. Changing this example over to computer terminology, the computer can *randomly access* any location in the memory to store or retrieve data.

Semiconductor memories are used in computer systems because they are fast—the time it takes a computer to randomly access a memory location is typically measured in billionths of a second (nanoseconds). Typical access times that are specified for the various semiconductor memory types range from about 100 nanoseconds up to about 500 nanoseconds. Disk memories, in comparison, are almost 1000 times slower, with access times measured in thousandths of a second (milliseconds), while tape memories are even slower, with access times, that can reach several seconds. Thus, one simple gauge of the maximum system performance is the speed of the memories—the faster the memories, the better the overall system output or throughput, since data can be moved faster through the memory.

Typically, all computer memories have some common signal lines that provide the control and data paths between the memory and the computer. For example, all memories have *address lines*. These are the lines over which the microprocessor transmits the memory location number that it wishes to access.

Similarly, all memories have *data lines*. These are the lines over which the microprocessor sends and receives the information and instructions that it stores or reads from the memory. Additionally, depending on the memory type, the data lines may be able to handle information sent in both directions (bi-directional), or the memory may have separate data lines for information going into the memory (data-in lines) and information going out of the memory (data-out lines).

Semiconductor memories can be classified as either RAM (acronym

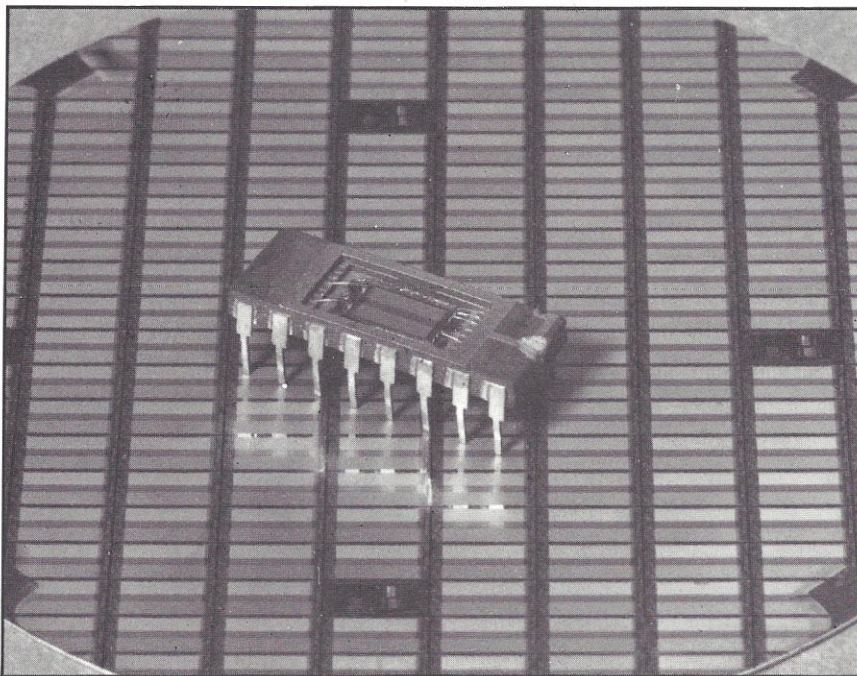


Fig. 2—A recently-announced 64K dynamic RAM from Texas Instruments.

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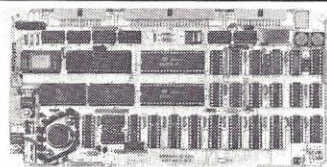
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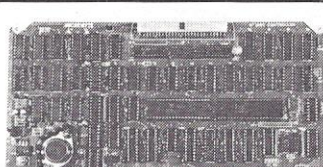
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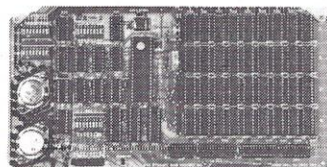
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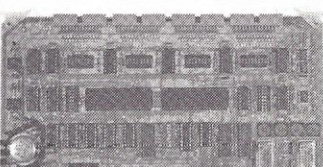
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SOLID STATE MEMORIES

for Random-Access Memory) or ROM (Read-Only Memory). Actually, both the RAM and ROM are random-access memories in the sense that any location in the memory can be accessed at random by applying the proper address. In a RAM, binary numbers can be

entered, or written, and also retrieved, or read. Thus RAMs are also known as read/write memories. On the other hand, the ROM is designed primarily for reading out data or program instructions that are not likely to change.

The RAM is used for temporary

storage of programs and changeable data. RAMs, for the most part, are volatile; when power is removed, all contents of the RAM are lost. Generally, before power is removed from a RAM, its contents are loaded or stored in a non-volatile memory such as a magnetic tape, disk or bubble. Then, when the system power is turned back on to proceed, the data for the RAM must be loaded back.

Static vs. dynamic RAMs

RAM memories can be grouped into two general classes, static and dynamic. A static RAM uses a special type of circuit known as a flip-flop circuit, and other circuitry, to determine the 0 or 1 state of its particular cell. Since complex circuitry is involved, a static RAM is generally limited in size. A dynamic RAM, on the other hand, stores each bit as a charge, or lack of charge, on a tiny capacitor. This technique greatly expands the memory potential of a dynamic RAM as contrasted with a static RAM. However, there is one serious drawback to the dynamic RAM.

The capacitors tend to leak or lose charge with time and the data represented will be lost or in error unless the capacitors are periodically recharged or refreshed. Thus, dynamic RAMs include special refresh circuits to restore the charge on the individual memory cells.

Although dynamic RAMs are more complex than static RAMs because of the refresh demand, they are smaller and thus can provide more memory for a given size chip. As a result, they cost less per bit and, in addition, consume less power than static RAMs. Both static and dynamic RAMs are volatile and will lose all stored data if power is removed. A 64K dynamic RAM is shown in Fig. 2.

A recently introduced memory type is the psuedo-static memory, which contains the dynamic memory structure together with most of the control circuits for refresh on a single chip. Thus, to the computer, the memory appears to be a static memory. The advantage of this technique is to improve memory density,

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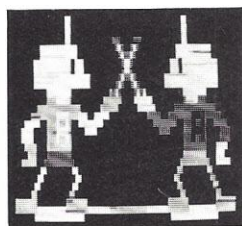
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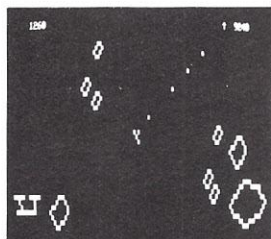
From Sub-Logic

The wait is over! If 3-D graphics seem impossible on the low resolution TRS-80, you haven't seen this brilliant program. During FLIGHT SIMULATION, you instantly select instrument flight, radar, or a breathtaking pilot's-eye-view. But be sure to strap yourself in -- you're liable to get dizzy!

Once you put in some air time learning to fly your TRS-80, head for enemy territory and try to bomb the fuel depot and airstrip while fighting off five enemy warplanes. Good Luck!

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TRS-80 Level II 16K
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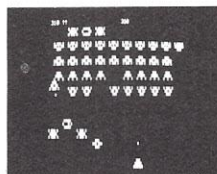
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By Hogue & Konyu from Big-Five
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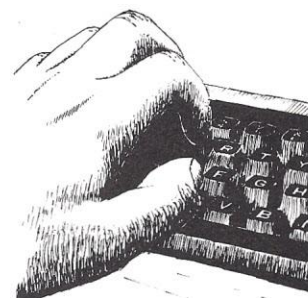
By John Allen from Acorn

Get your flipper fingers ready for action in this real-time, machine language game.

Lots of sound and flashing graphics make this fast action game so much like the real thing that you'll have to remind yourself not to shake your TRS-80. Choose from five playing speeds to match your skill. Can you beat your friends' scores? Will you avoid the dreaded "Bermuda Square?" Get PINBALL today and find out.

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By Ainsworth & Baker from Microsoft
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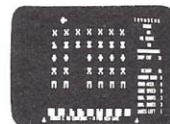
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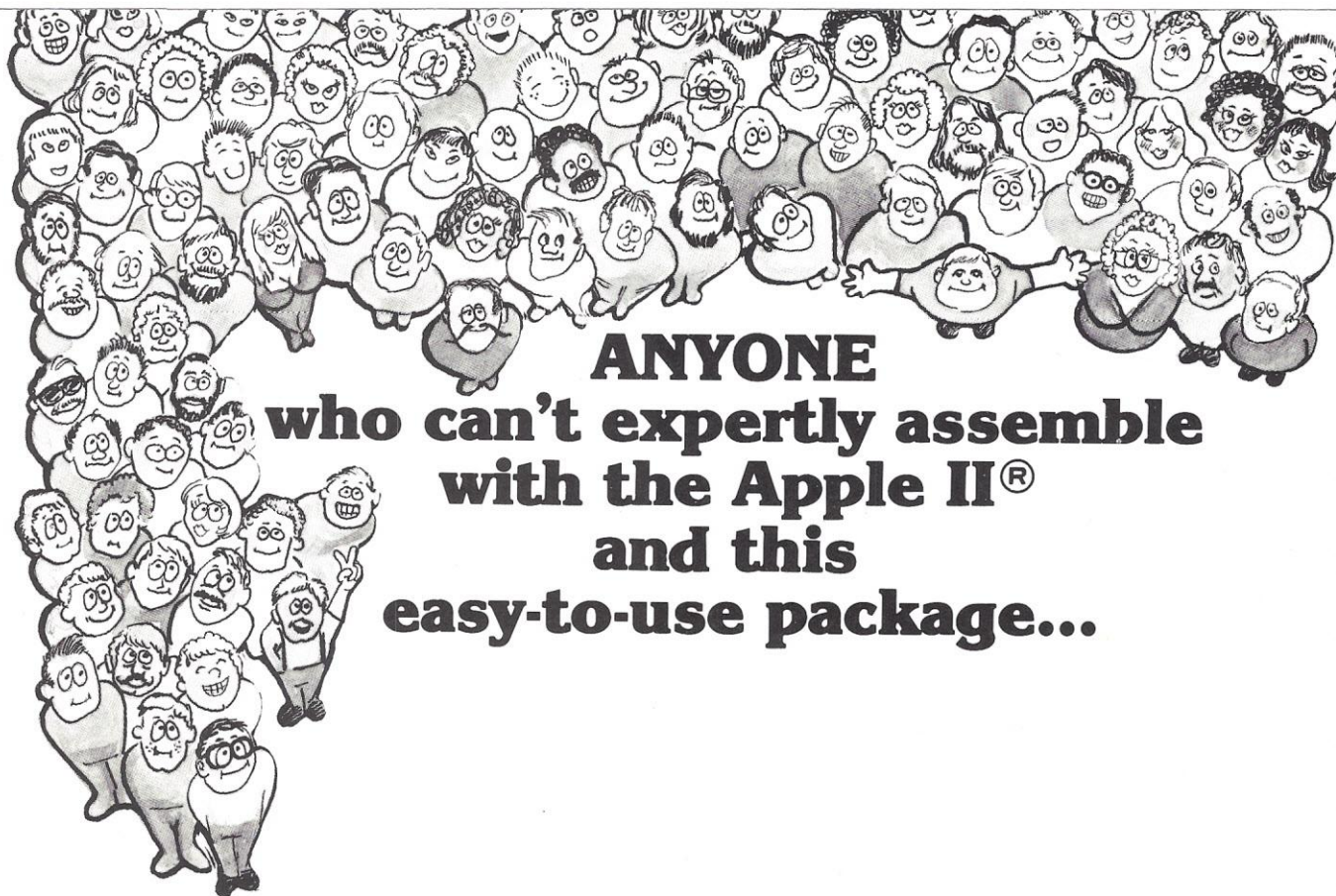


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with psuedo-static memories expected to reach 32K and even 64K by the end of the year.

ROMs, PROMs and EPROMs

A ROM contains information that is permanently designed into it and will retain this information even if power is removed. Thus, a ROM is non-volatile. ROM memories are available with a variety of programs and data for specific applications. Thus, a computer may include several dedicated ROMs that are immediately available to the user when the equipment is turned on; there is no need to load this information into the system from an external tape or disk.

Most computers use a mixture of ROM and RAM. The ROM offers the ease and convenience of storing frequently-needed programs and data while the RAM offers the read/write storage required to hold intermediate results of calculations and instructions. For example, a ROM containing the BASIC language can be purchased and plugged into the memory system of a computer. This is more convenient than loading BASIC into the computer's RAM each time a program involving BASIC is used and wasting several minutes of computer time.

The off-the-shelf ROMs advertised at low prices are mass-produced by manufacturers who prepare photographic masks to produce a high-density series of semiconductor cells, with appropriate interconnections, on a tiny silicon chip. The resultant ROM memory chip is written into or prepared at the semiconductor plant and is dedicated to its particular memory assignment.

However, suppose you prepare your own program and intend to use it often. Since it's your own innovation, it's not available as a manufactured ROM. It may cost \$1,000 or more to have a manufacturer design and develop a mask for you; obviously impractical unless you somehow intend to mass market your design. There are several less expensive options open to you, and others, who wish to develop their own

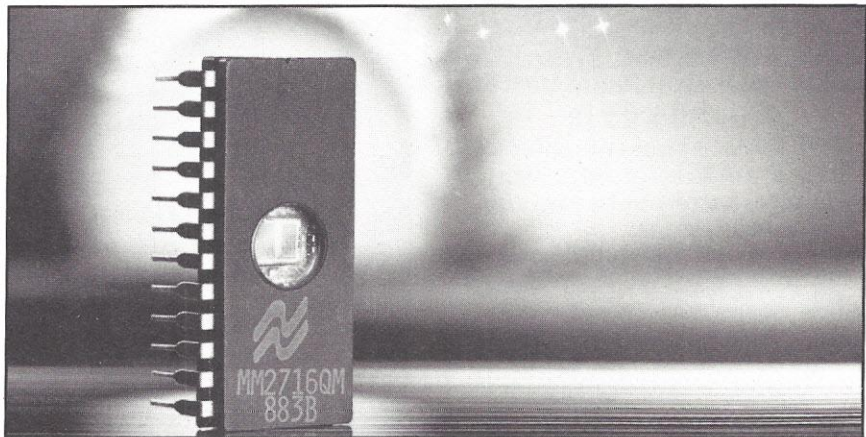


Fig. 3—This EPROM, from National Semiconductor, has a transparent quartz window covering the silicon chip. To erase the memory contents, an ultraviolet light is directed through the window.

ROMs. Three user-programmable memories are available: Programmable ROM (PROM), Erasable PROM (EPROM) and Electrically-alterable ROM (EAROM).

Programmable Read-Only Memory (PROM) devices, unlike mask-programmed ROMs, can be written

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- * Expandable on-board up to thousands of words and phrases (just add additional speech ROMs as they become available).
- * Four models, which plug directly into S100, Apple, Elf II and TRS-80 Level II computers.
- * Get it to talk by using either Basic or machine language (very easy to use, complete instructions with examples included).
- * Uses National Semiconductor's "Digitalker" system.
- * Includes on-board audio amplifier and speaker, with provisions for external speakers and amplifier.
- * Adds a new dimension and excitement to programming; lets you modify existing programs and games to add spoken announcements of results, warnings, etc.
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five	forty	400hertz tone	feet	left	out	speed	g	x	
six	fifty	80hertz tone	flow	less	over	star	h	y	
seven	sixty	20ms silence	fuel	lesser	parenthesis	start	i	z	
eight	seventy	40ms silence	gallon	limit	percent	stop	j		
nine	eighty	80ms silence	go	low	please	than	k		
ten	ninety	160ms silence	gram	lower	plus	the	l		
eleven	hundred	320ms silence	great	mark	point	time	m		
twelve	thousand	centi	greater	meter	pound	try	n		
thirteen	million	check	have	mile	pulses	up	o		
fourteen	zero	comma	high	milli	rate	volt	p		
fifteen	again	control	higher	minus	re	weight	q		
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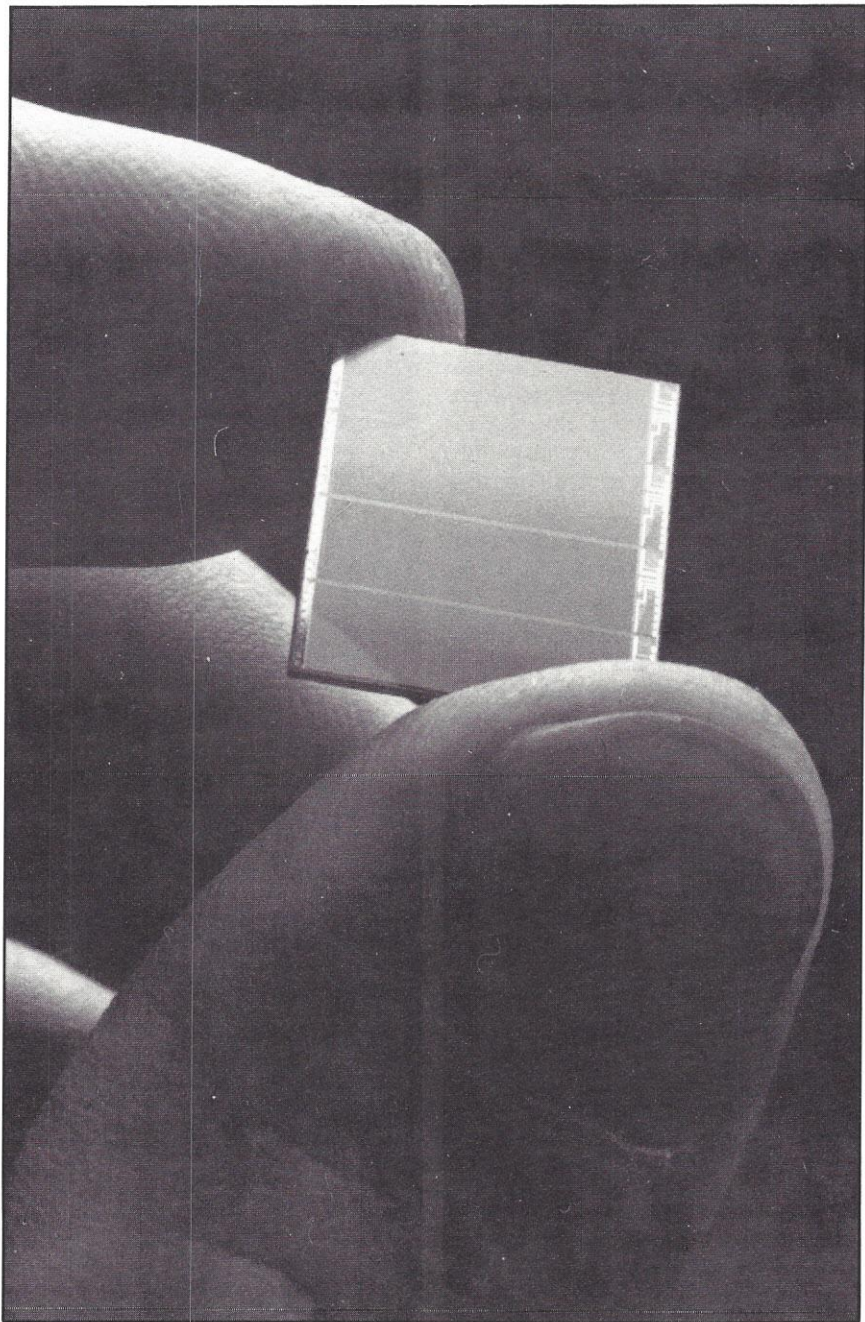


Fig. 4—This bubble memory chip, developed by Intel Corp., is capable of storing one million bits of information. Before being plugged into a system, it must be housed in a special magnetic package and equipped with special support circuits.

and burns out designated cell wires; as a result, a number of cells will be storing a 0 while others are storing a 1. Once a PROM has been burned or programmed, storage is permanent and the contents cannot be modified.

An EPROM (Erasable Program-

mable Read-Only Memory) also permits the user to write and store his own data or program but offers the additional flexibility of reprogramming. With an EPROM, as with a PROM, a programmer initiates the desirable binary storage states. If changes are required, the contents of

the EPROM can be erased by directing a strong ultraviolet light through a small quartz window covering the silicon chip, see Fig. 3. All the memory cells in the chip are erased and an entirely new reprogramming step is required to store a program or new instructions. EPROMs are convenient during systems development where a number of changes in program or data must take place before the final design is acceptable; then, if mass quantities are required, mass-produced ROMs can be custom designed and produced.

Read and write with EAROMs

The more recently developed Electrically-Alterable ROM (EAROM) uses electrical signals rather than ultraviolet light to erase the ROM contents. It is sometimes called a "read-mostly" memory since it can be used to read or write; however, its writing speed is very slow and must be preceded by an erasing step. Both the EPROM and the EAROM use small charges of electricity to store information and thus can retain this information even if power is removed. Currently, there are two types of EAROMs available. One group of devices are bulk erasable; the entire memory contents are wiped clean with one signal. Another group is word alterable; individual bits or words can be changed without destroying the entire memory content. An added advantage of EAROMs over EPROMs, which use ultra-violet light, is the elimination of the need to remove the memory from the computer. Erasing is accomplished by applying appropriate electrical signals to the computer with the memory in place.

A computer can include plug-in printed circuit cards containing a variety of ROMs—ROM, PROM, EPROM and/or EAROM. With these permanent storage ROM devices, there is no need for the user to load commonly-used programs into his computer each time he is ready to undertake a project.

Semiconductor devices are commonly used in the main memory section of personal computers, while

cassette tape and magnetic disks serve as external mass-storage elements. However, a new form of memory is challenging the electro-mechanical mass-memory media with benefits of higher reliability (no moving parts) and faster access time. This new entry is the magnetic bubble memory (MBM).

An MBM is formed by depositing a thin film of magnetic material, or a garnet, on a nonmagnetic substrate. The atoms of the garnet act like tiny magnets; with no external magnetic field applied, half of the atoms have their north pole facing one way and the other half of the atoms have their north pole facing the opposite direction. When an external magnetic field is applied perpendicular to the garnet, magnetic interaction forms small cylinders or magnetized domains referred to as magnetic bubbles. Thus, the presence or absence of a bubble is a function of the applied external magnetic field; for data storage, a binary 1 indicates the presence of a bubble while a 0 indicates its absence.

An MBM includes the bubbles in the thin-film garnet plus tiny permanent magnets acting as the external field plus a set of perpendicular coils to create a rotating magnetic field to serve as a means to move the magnetic bubble or data bit from one position to the next. The MBM is a serial data storage device, with the data in the form of a magnetic bubble. Special circuits are used with MBMs to detect, store, and erase magnetic bubbles, see Fig. 4.

MBMs with 256K and 1 Megabit storage capacities are currently available. Also, since MBMs are magnetic devices, they are non-volatile and data will not be lost even if power is removed. The drawback of the MBM is also identified with its magnetic characteristics; access time is in the 10 millisecond region, compared to 100 to 500 nanoseconds for RAMs.

While MBMs will find their place in mass-storage applications, floppy disks and tapes will still offer lower cost and considerably higher storage density in some time to come. 

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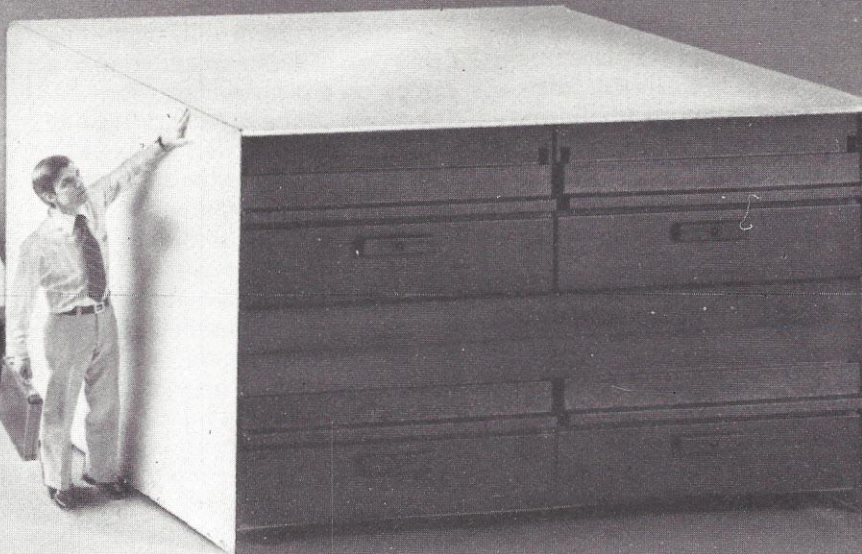
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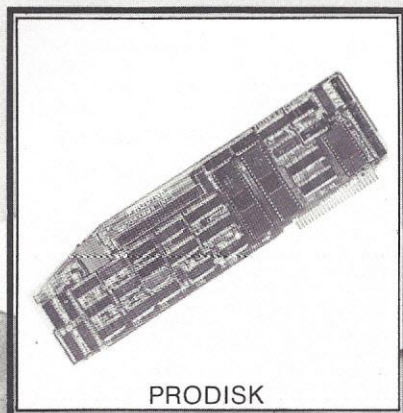
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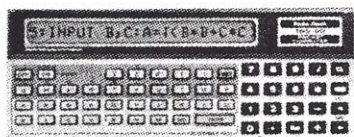
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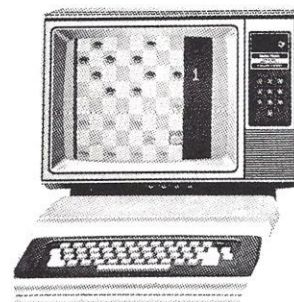
26-3501 1.9K P.C. \$221.00
26-3503 Cassette IF. 45.00
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MODEL III

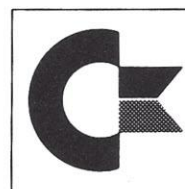


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Doctors Find Cure for Professional Income Distribution

Are you a professional person who has to struggle every month with a complicated formula for income distribution for each of the members of your partnership or professional corporation? You can let your computer do the work for you! Rather than using a hand calculator to keep track of the various formulas you can make up a program that will allow you to input the data for each person in the group, calculate the formulas in a logical sequence and print out the results.

While working with a group of physicians in the Midwest, I devised the following program. It is a flexible formula which could be adapted to meet the needs of different groups. The program is written for the TRS-80, Level II with 16K memory. In the format there is room for 31 individuals.

Let's look at some of the specifics of the program. There is an introductory section that provides documentation for what the program will do. Memory can be saved by omitting this part. The program distributes income to members of a professional group according to a pre-determined formula. It assumes that a basic salary is being paid based on estimated earnings. Adjustment to the actual income is made by means of a *bonus* that corrects for any over or under payment of salary. The time period used can be any increment desired. The program does not have the ability to calculate a

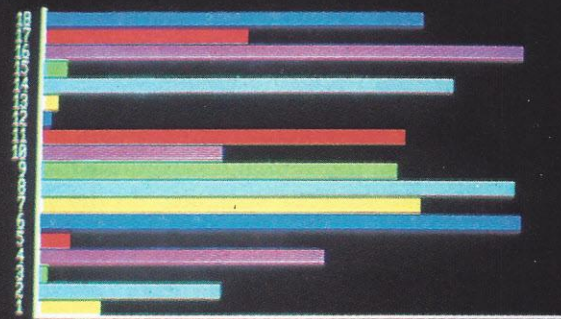
running balance; that is, it will not add current income to previous income. Of course, you can provide this information each time you type in the income information. The amount of income billed for the time period is called "Total Production". This is not the actual income earned because of overhead expenses. Therefore, the total production number is used to determine the amount that each person contributes to the total "Base Production" and is expressed as a "Percentage of Base Production".

The amount of money available after the overhead expenses are paid is then entered as a net sum, and this amount is distributed to each of the members of the group. If this is done solely on the basis of production it is a simple matter to pay each person according to his percentage of base production. The program provided here is a "70-20-10" program which gives weighting to each of the members according to equality and longevity, as well as their production. Twenty percent of the income available after overhead expenses is divided equally among the members. Ten percent of the amount available is distributed according to a longevity formula so that each year of longevity counts as one point beginning at zero for less than one year and increasing to three for three years or more. It is necessary to keep track of the total number of equality points and longevity points when running the program.

continued on page 56



Month



10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

New Product (P) / Monthly R.O.I. (\$000)

NEC
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1280x1024

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BRIGHT

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NEC I/O Unit
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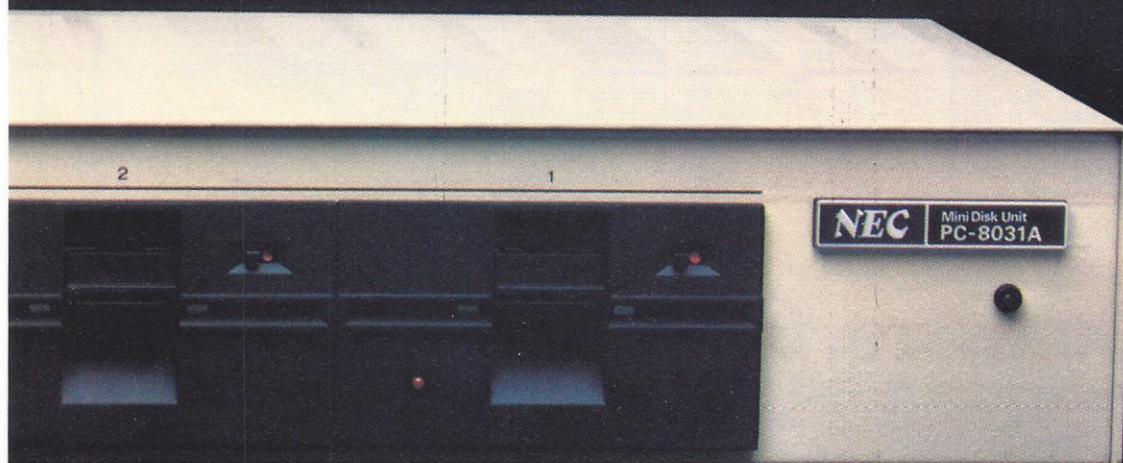
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CIRCLE 28

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RUSH	7650.00	16.2673	3342.79	1174.24	733.90	5250.93
CUSHING	11272.00	23.9692	4925.48	1174.24	489.27	6588.99
ALBRIGHT	8745.00	18.5957	3821.27	1174.24	244.63	5240.14

TOTAL	47027.00	100.0000	20549.20	5871.20	2935.60	29356.00

AMOUNT AVAILABLE AFTER OVERHEAD = 29356.00						

Many professional groups will have some type of retirement plan which will set aside a specified percentage of the income as deferred compensation. The sample program listing does this deducting a percent of the income for a retirement fund and excludes that amount from taxable income. Other formulas could use a flat dollar amount deduction, or a profit sharing plan. An example of a profit sharing plan that with-

holds 7 percent of income earned, up to the maximum on which Social Security is withheld (\$25,900), and 8 percent of all income above that limit is shown in the box. Before using the formulas in the profit sharing example, you should check with your tax advisor to be certain that he agrees that the calculation is in agreement with tax law. In any event, if you modify this portion of the formula, you will need to dimen-

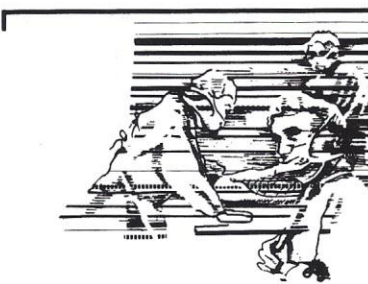
sion the variables (W, AW, SA, IN, TC, PS).

Using this formula, I will give an example of an income distribution. A person who contributed 25 percent of the total amount of income available for distribution would receive 70 percent of his 25% share as production, he would receive an equal share of the 20% of the total available, and he would get an additional share of 10% of the total if he

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68.6396	4000.00	230.00	4230.00	495.84	4495.84	525.09
58.4545	5600.00	532.00	6132.00	-201.91	5600.00	658.90
59.9216	5000.00	210.00	5210.00	-493.87	5000.00	524.01
62.4237	23500.00	1381.00	24881.00	1539.40	25735.20	2935.60

had been a member for three years or more. He would get less in the longevity category if he were in the group less than 3 years.

Many other formulas have been tried including "80-10-10", "90-10-0" and "100-0-0". Each group will have to determine for itself what is the fairest distribution. "Fudge factors" can be introduced to correct inequalities; such as, additional income for a "Director" that does not have to go through this formula. Alternatively, each person could be guaranteed a maximum or minimum income or percentage. The percentage return is the amount paid each person (Total Compensation) divided by the amount earned (Total Production). The members could be guaranteed that their percentage return would not fall below 50 percent or rise above 70 percent. If the formula calculations show that a member has gone outside this range it would be necessary to re-distribute income to bring that person back within the guaranteed limits. These permutations add considerable work in making the calculations. Each time someone exceeds the limits the entire program must be re-run. At least, it is much easier to do it with the computer than it is with a hand calculator. Also, the basic information which is typed in at the start of the program regarding each member, production, salary and insurance can be saved on tape and re-entered without having to be typed over again.

If you do not have a printer, the information can be displayed on the screen and copied by hand. With a printer, you can print out the data in

ledger form. If your printer's maximum width is 8 and one-half inches (as mine is), the program will form feed the second half of the calculations which can be taped to the first half to give a 17 inch wide statement. (Your accountant will like that.)

The program allows you to keep track of a large number of variables without having to refer back to scratch pads or notes. When running a program for 31 persons it is very

helpful to be able to store the data on tape. Experimentation with the formula is much easier when the basic numbers are stored on tape, and do not need to be re-entered from the keyboard. A word of warning, the data should be saved on tape as soon as possible so that an error developing later in the program or a loss of memory space will not mean the loss of all that information!

continued on page 102

PROFIT SHARING PLAN CALCULATIONS

PO=percentage of first profit sharing contribution (7%)
PT=percentage of second profit sharing contribution (8%)
FI=FICA (Social Security) base salary (changes almost yearly) (\$25,900)
A=Number of months which have passed in current fiscal year
W=Calculated W-2 income
AW=Actual W-2 income
SA=Salary paid to date
IN=Insurance paid to date
TC=Total compensation earned (based on the formula)
PS=Profit sharing contribution

I. Determine W-2 Income

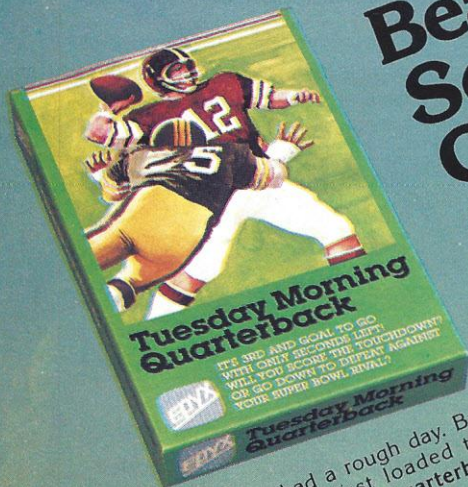
$$W = (TC - IN) + (PO * (A/122) * FI)$$

The Actual W-2 income (AW) equals W if W is greater than the person's salary paid to date (SA). If the person was paid (SA) more than his taxable income (W) then AW=SA.

II. Determine Profit Sharing Contribution

$$PS = (PO * (AW - FI * A/12)) + (PT * AW)$$

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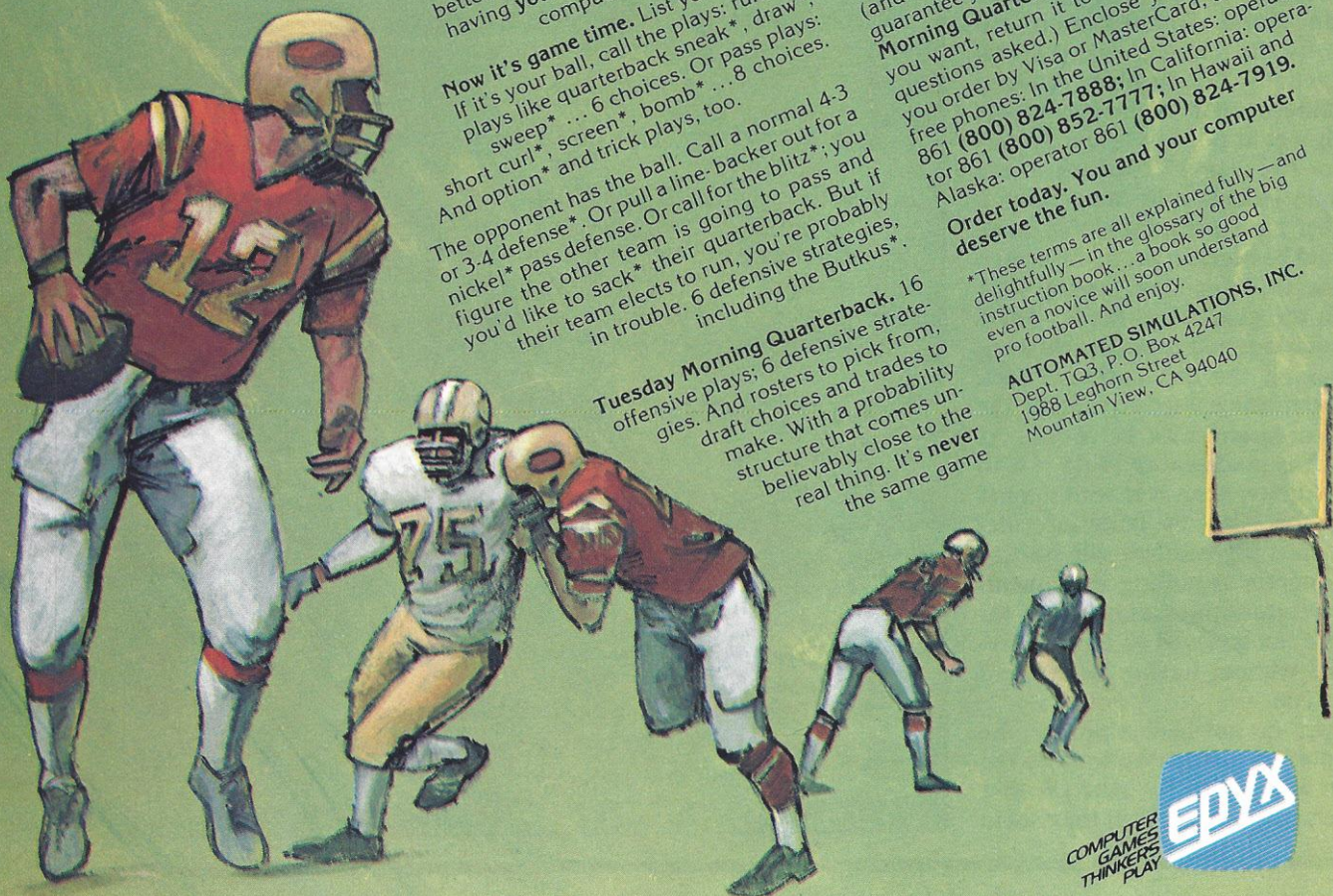
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continued from page 28

cated percent or quantity, such as "GROW Sales by 10% per period."

- Greater or lesser of functions that comparing variables or values in columns.

- Expanded functions, such as MINIMUM, MAXIMUM, AVERAGE and CUMULATIVE.

- Column references, or "lags and leads," in which you can make a current calculation using previous information, such as an accounts receivable function in which you must refer to at least two previous months' sales to determine current month receipts.

- Line references in which a command incorporates an entire line into a new calculation. An example from a TARGET manual: "?LINE 8 LABOR COST = LINE 7 * 4.00."

- Expanded printing commands and parameters for more selective or more detailed reports.

- More detailed manuals and examples for reports, crucial factors in any selection.

- Split-screen command, found on Ohio Scientific's PLANNER PLUS.

- Sophisticated consolidation procedures that combine models or parts of models.

- A greater number of available rows and columns, such as Ohio Scientific's range from 12 columns and 748 rows to 128 columns and 102 rows.

Special features found more often in the first category than the second, but which set apart some less expensive packages, include:

- T-MAKER's 28 command functions, including many logic functions, and 20 math functions, including absolute values, squares and positive and negatives numbers.

- Sort functions, as in T-MAKER.
- Combined full-screen editors and numerical analysis functions.

First Category. These three programs include all of the above features and functions and add many more that put them on par with most of the time-sharing packages. The extra features include:

- Extensive use of programming-like languages to construct a model and perform operations and functions.

- A graphics generator for bar, pie or other charts.

- Sophisticated utilities for generating automatic model operations or constructing simple question-and-answer structures, so novices can use the modeling package.

- Calculation of financial functions with built-in formulas, such as net present values, internal rates of return, payback periods, depreciation and mortgage loan amortizations.

- Advanced editing features, such as RCS's "duplicate, move, find, replace, display, fix, slowrite and slowread" commands.

- Advanced calculation features, such as simultaneous equations that can be placed in the model's own logic.

- Extensive consolidations from multiple files, such as bringing together, in one simple operation, the reports from three or four company divisions and performing calculations on all of them with a new formula, constant or variable.

- Advanced formats to generate reports.

- The ability to divide into segments a model that is too large for one work sheet.

From these features, it becomes clear how useful any of these packages can be, depending directly on your level of sophistication and your company's requirements. It is equally clear that only persons experienced in modeling will be able to use the advanced packages, while anyone can learn the simpler ones within a few weeks. The authors and their marketers say of the advanced packages that it will take at least a month even for a professional, practicing every day, to learn how to use RCS, FPL and MINIMODEL with real success.

Just dive right in

Faced with all of this unfamiliar power, many novices, and even pros facing RCS for the first time, may

hesitate to take advantage of it. If the experience of 50,000 people with VisiCalc counts, however, your best bet is to just dive right in. But learn first how to establish a model, especially if you choose a more sophisticated modeler. It's not hard, but it requires some forethought (see the accompanying discussion, "10 Steps to Building a Financial Model, for more details).

If you have some basic programming experience, you will quickly find that model building is much like writing a program. In fact, the structures of the more complex modelers are based on programming languages and require you to use numbered lines and follow precise logic and syntax.

A model should be considered first as a tool that can grow and change. Consider it an evolving picture of how your business activity changes. Start simply, building an easy model that summarizes your most important financial activity. Before you do anything, however, read the user's manual and supporting material straight through. Get an idea of the overall structure of the package, even if you can't understand half of what you've read. Only then should you put the disks into your computer and start building your own models.

Then chart the model on paper, perhaps using your existing forms, such as balance sheets, pro forma statements, profit and loss statements or sales statements. Next build the "logic," or mathematical operations and relationships, in the proper locations of the paper sheets. The simplest is:

1Ø = SALES

2Ø = EXPENSES = 75Ø

3Ø = PROFIT = SALES - EXPENSES

That is a complete, simple model, much like "Dick sees Jane" is a complete, simple sentence.

Now insert the form of your report and your logical operations into the computer. Print out and modify your worksheet as required. Type in test information, and run tests of the

model. Modify the logical operations and formatted work sheets (or grid) as required. Keep testing until the first one meets your requirements, and then run "live" data.

Taking the standard features into consideration and having in mind what could be your own situation—small-business operator, financial manager, corporate officer—as well as the various categories, let's review the financial modeling packages for the major microcomputers. These include Apple II and ///, TRS-80 Models I and II, Commodore CBM and CP/M-compatible computers.

As the categories indicate, the configurations on which these programs run vary widely. They range from a TRS-80 Model I with 16K RAM cassette for Hayden's FINPLAN to the 64K Apple with three disk drives for RCS. However, in the middle category, the average configuration is 48K RAM with two mini-floppy disk drives and a dot matrix printer.

RCS: for experienced users

Ferox Microsystems' RCS is an excellent, sophisticated financial modeling tool that only people with considerable modeling experience should tackle at first. Priced at

\$1,500, it will appeal to corporate managers and financial analysts who want to replace their time-sharing financial models. They can do so and save thousands of dollars a year; in some situations the savings can be more than \$50,000, plus additional connect and storage charges. RCS's operations compare favorably with the performance of almost all time-sharing packages.

RCS runs on an Apple II with 64K plus three disk drives, or an Apple /// with two external disk drives. It allows each model to have 1,919 "cells," or row and column inter-

FINANCIAL MODELING Chart of Features and Functions															
	COL-UPAD	Dec. Evaluator	EXECUPAN	FINPLAN	FPL	Info Analyst	MINIMODEL	PLAN 80	PLANNER PLUS	RCS	REPORT WRITER	TARGET	T-MAKER	UCM/UBM	VISCALC
OPERATORS															
Arithmetic (+, -, *, /)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Exponents	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Trig. Math (sin, cos, tan)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Percentages	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Constants	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Square Roots	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Spcl. Equations	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CONDITIONALS															
(=, ≠, >=, <=, <, >)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
STATEMENTS															
Logic (If-Then-Else)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Grow	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Sum of Lines	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Min/Max	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Average	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cumulative	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Greater/Lesser	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Totals	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
FINANCIAL FUNCTIONS															
(Additional)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
FUNCTIONS															
Depreciation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Present Value	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Absolute Value	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Lags/Leads	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Parentheses	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Positive Value	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

sections. RCS runs through eight subsystems, including a line-oriented text editor, a remarkably easy-to-use and powerful graphics generator, a report generator and a number cruncher.

It has four types of functions, each of which includes more functions than any other modeler available: arithmetic, cross-column (lags and leads), financial, and comparison (or conditionals, as they're also called). The powerful financial functions include Net Present Values, Multiple Present Values, Internal Rate of Return, Payback Period, three Depreci-

ation methods with variations, and five loan amortization functions, including tax loss carry-forwards.

Its powerful but simple graphics generator produces complete pie charts, quick pie charts, bar graphs, "stacked" bar graphs and line graphs, all with six answers to simple menu queries. And each portion of each graph is described with information already stored in the model.

You can also highlight in various colors parts of the pie or bar graphs. Even better, the generator will construct a "slide show" of charts and graphs you can present at meetings.

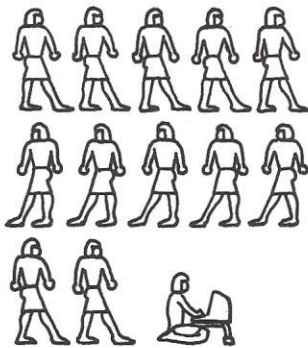
This generator is truly one of the most remarkable features anywhere. It is not usually found as standard equipment in either time-sharing or micro-based modeling packages.

RCS's advanced text-editing and utility features have been mentioned, but let's add that it has three methods of consolidating models: (1) By section; (2) By line item; or (3) By time period. It will also consolidate multiple models, sections, items or periods within several models.

Its only drawback is that it doesn't integrate with other data bases or a general ledger. And the preliminary

	COL-U-PAD	Dec. Evaluator	EXECUPAN	FINPLAN	FPL	Info Analyst	MINIMODEL	PLAN 80	PLANNER PLUS	RCS	REPORT WRITER	TARGET	T-MAKER	UCM/UBM	VISCALC
Negative Value			•							•			•		
Mean			•												
Stan. Deviation			•												
Variances			•												
Others		•	•		•	•	•	•	•	•	•	•	•		•
CONSOLIDATION															
Column/Row	•		•		•		•	•	•	•	•	•	•		
Multiple Col/Row	•		•		•		•	•	•	•		•	•		
Model-to-model	•		•		•		•	•	•	•		•	•		
TEXT EDITING															
Global Search			•							•			•		
Move Row/Col	•	•	•		•	•	•		•	•	•	•	•		•
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PROFESSIONAL COMPUTING

version of the RCS manual is too detailed at times and doesn't offer enough examples to explain how to construct a complete model. It's too oriented toward individual features, which separately are impressive; it doesn't show adequately how to put all the pieces together. Yet Ferox, founded by Rusty Luhring, RCS's author (RCS stands for Rusty's Computer System), provides excellent support and is working on a new manual.

FPL: powerful, yet simple

C4P Inc., Information Access Division's FPL (A Financial Planning Language), marketed by Lifeboat Associates, has undergone a significant revision since it was released last February. Lifeboat's marketing director, Roland Jaffe, says the revised version, released April 15, has been compiled and runs with 48K CP/M systems without Microsoft BASIC. It will run seven to eight times faster than the first version. Lifeboat did not release the earlier version of the \$695 package.

Based on the TAB time-sharing modeler, a simple programming language, FPL is powerful, with advanced calculating and computing capabilities. It has up to 170 rows and columns in each work sheet, with any combination—10 columns and 17 rows—and works through a simple, yet strict logical hierarchy of rows, columns variables, data and rules. In the rules section, one can enter BASIC programming statements and commands. FPL is based on a simple set of three menus, including planning, definitions and a work files selection menu.

Its data generating capabilities include automatic addition of entered items, automatically repeated values, a four-function "grow" feature and amortized and target values. It offers two levels of mathematics—"quick math" and extended math. The latter is an enhanced logic processor that calculates rows within ranges of col-

umns, calculates columns within row ranges, and calculates values offset inside the work sheet. The quick math includes five arithmetic functions and IF, THEN, ELSE logic.

FPL also allows multiple statements per line, lets a user build question-and-answer dialogues and accepts external data files. Its analytical power allows "what if" sensitivity analysis.

Its advantage over VisiCalc and similar programs, Jaffe says, is that one writes a program with rules and can pull out information from another file and insert it selectively to another spot.

FPL produces reports that the user defines in advance. The user can insert footnotes and produce summary reports. The program does not produce graphics.

Like RCS, FPL will require that professionals work with it for several weeks before they master its features. While the FPL manual explains the pieces well, its examples and sample runs of the most difficult sections are not clearly written. However, in style, appearance and explanation of the pieces of the puzzle, this manual is superior to RCS's. It, too, is being revised, Jaffe says.

Sophistication at \$495

Financial Planning Associates' MINIMODEL (\$495) is a third very powerful and sophisticated modeling package based on time-sharing packages. Marketed in the U.S. by the new WESTICO software distributor, MINIMODEL runs on any CP/M-based 48K system with a Z-80 or 8080 microprocessor. It has one important advantage: its model sizes are limited only by disk space, while FPL and RCS both have "cell" limitations. If the model is too big for available RAM, then it is stored on disk in segments.

MINIMODEL has a unique logic structure based on rule sets composed of several elements. It inverts the definition of a problem by first identi-

Desktop/PLAN Cuts Service Bureau Expenses

VisiCalc, the micro-ancestor of these modelers, is heard about very often, but its sister program, Desktop/PLAN, also from Personal Software, has had less publicity and made fewer sales. If Coherent, Inc.'s experience proves anything, however, one shouldn't overlook Desktop/PLAN when searching for a micro-computer modeler.

Even better, Personal Software has announced a new version of the program, Desktop/PLAN II, that includes an important enhancement—the ability to directly integrate with VisiCalc. Two other new features include high-resolution graphics and a moving cursor that helps improve data entry speeds.

Although she hasn't yet used the new features, Coherent, Inc., staff member Donna Kessler has pushed Desktop/PLAN to its limits and, with in-house programming, far beyond where the package was originally meant to go.

When Robert Quillinan, controller, began with Coherent, the firm was using a service bureau to do departmental expense reports and summaries only. "We could only do two passes over those reports and summaries, and it cost \$10,000-\$11,000," he comments.

But, he spent \$11,600 on hardware—Apple IIs, a Corvus hard disk and the special "Mirror" videotape recorder interface—added Desktop/PLAN, and has constructed an enormous, consolidated budget for Coherent's 13 subsidiaries and two divisions.

"We couldn't do this by hand. When you're dealing with 150 separate sheets, you can't go back and change one incorrect number in the middle and recalculate the whole thing," Quillinan says.

Kessler describes the Coherent budget's basic structure. It has four levels of consolidation: by individual department (total of 200); by subsidiary (13); by division; and total company.

fying the "destination cell" and then setting up the necessary calculation to get the results into that cell. But it uses simple, sequential math to do so. It is based on some time-sharing software, except that it does not have a strict hierarchy like FPL; it uses straight-forward linear operations.

Each of the elements of the program's rule set define an operation that the model carries out.

Not all rules use all elements and this structure seems difficult at first, but is very easy to grasp with MINIMODEL's well-written manual.

The system is organized into four data files: Descriptions, including row numbers, and row descriptions; Rules, which stores the computational rules for each model; Results, created by the processor, which holds the model's output; and Consolidation, which holds the required rule set. There is also a printing file that gives the user wide flexibility in determining report formats.

The package's manual is the only

one written primarily with tutorials. After a basic system description and explanation of its unique structure, the manual guides the user through 16 lessons that give more and more detail about the system's operations. At the end the manual also gives a clear, thorough example of how to build a model. The presentation is step-by-step and well-organized. Its explanation of modeling at the beginning was the best offered.

Although it doesn't have functions as varied as those of RCS or FPL, nor does it offer graphics, MINIMODEL is a well-prepared modeling system that many professionals can put to good use.

T-MAKER: power for \$150

Developed by Peter Roizen, T-MAKER is one of Lifeboat Associates most popular programs. It combines a powerful numeric analyzer and a full-screen editor with such features as global search and replace, text formatting and justification. This \$150 program works on any

CP/M-based system with CBASIC-2, and 240K bytes of disk storage.

For the price, it is almost as powerful as the more expensive modelers. And it is undergoing a thorough revision. Roland Jaffe, Lifeboat's marketing chief, says the new version will be in a very fast "C" Compiler and will include dozens of new capabilities, such as string manipulation, matching files and two dozen predefined math formulas.

T-MAKER includes 40 editing functions and 26 English-like computing functions, including find, sort, replace, insert, combine, go to and list—all rarely found in financial decision-making software. Although each file can contain no more than 62 lines of 100 characters for 48K systems the file capacity doubles with a 56K system.

The heart of T-MAKER is the "compute" function, which consists of preparing a table file. The table includes headings, numbers and the equations that calculate other num-

bers in the table. The program places row instructions, from commands to mathematical operators, in the left-hand margin of each line, with column instructions, up to 10 rows deep, above the table of figures.

One proof of T-MAKER's effectiveness is that its marketer, Jaffe, uses it for all of his own financial

constant value equations and BASIC equations.

The program's manual clearly explains this fundamentally different approach and gives many complete examples. The manual also comes with a laminated "quick reference card," which briefly discusses all of the program's functions, commands,

said about the program. Briefly, however, let's review the developments from Personal Software within the past few months. It remains the most popular financial analysis software and lacks only the ability to accept programming rules and to consolidate different models to be as capable as the best modeling software.

Personal Software has made the program available on a wide range of personal computers, covering most of the marketplace. It now runs on 32K Commodore CBM Sseries machines. The 48K Atari 800, the Hewlett-Packard HP-80 series with HP-s added graphics enhancements, the Apple II and /// and the Radio Shack TRS-80 Models I, II and III. The TRS-80 Model III VisiCalc is the latest, and Radio Shack offers several versions, each with different capacities and features ranging in price

Financial models can also be used to look backward and analyze a company's past performances. They can help managers discover where problems occurred.

analysis and modeling work for the company. It has almost all of the math functions and operators of RCS, and more math than FPL or MINIMODEL. It includes trigonometric functions, minimum and maximum values, square roots, absolute values, reciprocals (the only program to use this), a "grow" function,

files, and basic and constant equations and gives an example of how a model is organized. This is invaluable to the harried user who doesn't want to waste time thumbing through a manual's detailed explanation.

VisiCalc: still popular

As for VisiCalc, it would be hard to say anything that hasn't already been

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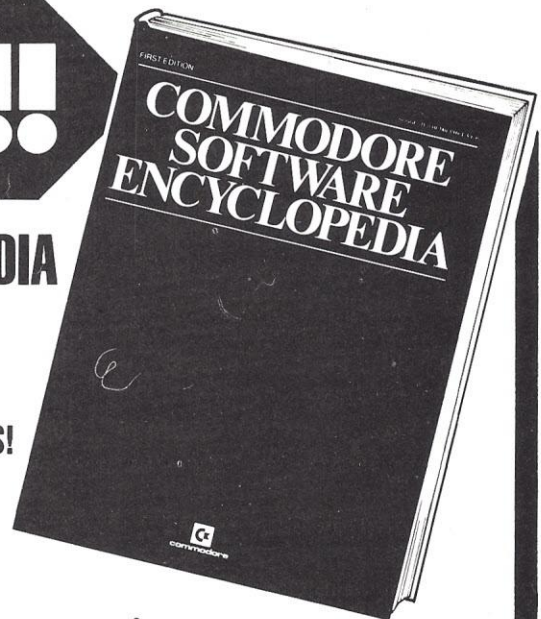
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from \$99 to \$299. The Commodore and Atari VisiCalc versions cost \$200 each, and the HP version \$250.

Apple has made VisiCalc III the key to selling its new Apple /// models. It has combined a 96K Apple /// with Business BASIC, VisiCalc and a mailing-list program, and the result is an Information Analyst system. For more than two years, the Apple Decision Evaluator has combined an Apple II Plus with the original VisiCalc, Desktop/PLAN and ApplePLOT to give a powerful, though less than perfectly interactive, financial tool. However, until recently, this tool has been the only financial analysis software that produced graphics in any way comparable to RCS. It does so at a fraction of the cost, but with a lot more effort required of the user.

Personal Software has just announced several new programs that can be used for financial planning and can produce high resolution graphics easily (see p. 77). Among these are a new version of VisiCalc that includes 17 new commands. Another feature of the new VisiCalc program is the Data Interchange Format. This feature makes it possible for the new VisiCalc to interface to VisiPlot, VisiTrend/VisiPlot and Desktop/PLAN II.

Like VisiCalc, Personal Software's Desktop/PLAN has been upgraded and a new version, Desktop/PLAN II, has been introduced. New features in the revised program include high-resolution graphic plotting and simplified data entry.

The graphics feature can be used to chart up to two data series in bar or line format. The data may be generated by Desktop/PLAN II or transferred to it from VisiCalc using the Data Interchange Format.

The entry of data into the Desktop/PLAN II program has been simplified through the use of a moving cursor to indicate which line of spreadsheet data is being entered.

Once the model is constructed, the starting values may be varied. The program will print an analysis up to

18 columns wide or up to 300 lines deep. Headings, titles, formulas and data are completely under user control. The program allows a periodical printout during the setting up of the worksheet for an ongoing record of how the worksheet stands or to review the calculation rules being used. The program also provides for the writing of "custom calculation rules" to perform special calculations that the user may want. Up to 20 of these custom rules may be created and stored for later use in the same or other models.

Major features of the original Desktop/PLAN have been retained. Desktop/PLAN II can consolidate entire identical models or budgets, for example, into one master model, and can also transfer individual report lines from submodels into a master model. A financial model "larger" than the memory of the computer may also be constructed.

TARGET: no experience needed

A useful tool for those with no experience in financial modeling is TARGET, a \$195 financial modeler from AMSI. And it backed up by the best manual of any of the modeling packages.

It runs on two different machines: (1) A TRS-80 64K RAM with at least one disk drive and the CP/M version 2.2 from Lifeboat, and (2) The Apple II or II Plus with 48K RAM, two disk drives and a Microsoft Softcard, Language System or comparable 16K RAM expansion unit.

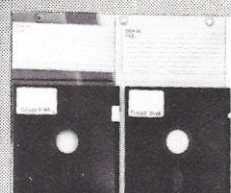
The TRS-80 version has a maximum matrix size of 1,000 elements—that is, 100 rows and 10 columns, or 11 columns and 90 rows, and so forth. The Apple II version can take only a maximum of 900 elements.

The system also has a TGTGEN utility that allows a programmer to configure TARGET for a machine and system other than the main two.

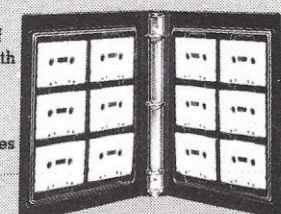
In general, TARGET is a very sophisticated and flexible modeler for the price. It has "leads and lags," re-

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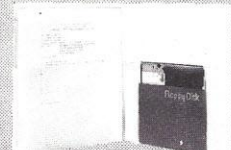
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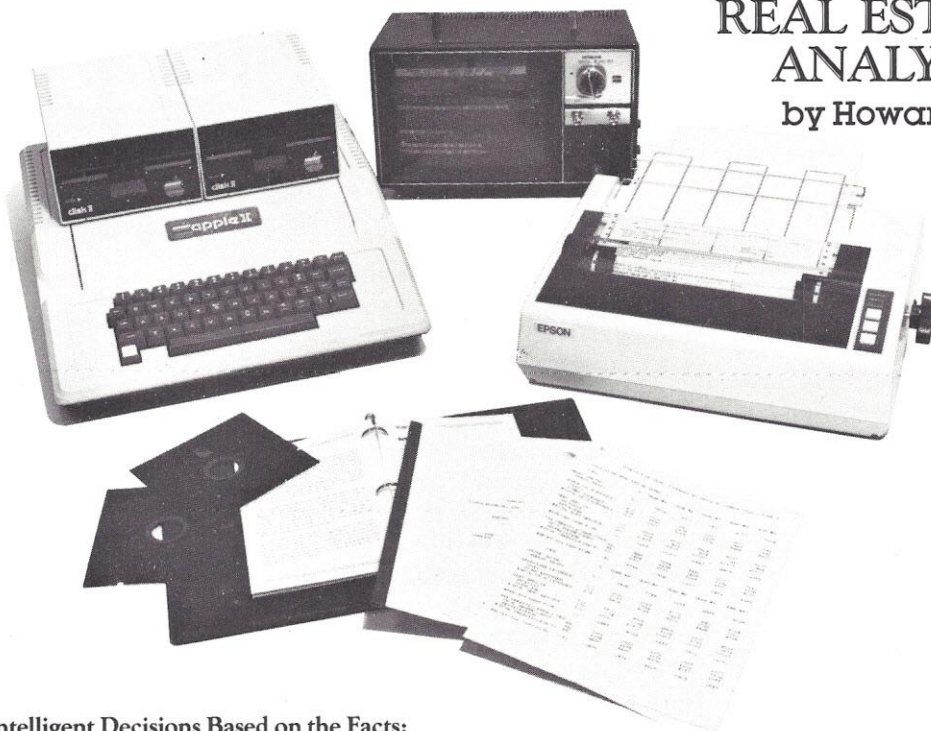


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calls "history" values from previous columns and uses a text editor with cursor control. It is menu-driven with one main selection, "create," which sets up and executes each model.

Like more sophisticated systems, it is based on programming-like structures with line (row), column and heading commands. Lines are numbered sequentially, starting with 1. Line commands can be data statements (numbers or words), operational statements (one of five math operators), and function statements (frequently used groups of operations).

TARGET uses English-like line program statements and combines them with math operators, much like FPL and other programs.

In addition to its math operators, TARGET has logic and conditional operators, including IF-THEN-ELSE statements and six conditionals. It also lets one use parenthetical expressions in operational statements, and it executes them according to common algebraic rules.

Although the package has many useful functions and features, TARGET hits the bullseye with its manual. Each function, statement and feature is explained very simply, so a novice can easily understand exactly what's going on. It is full of clear examples and excellent sample models. Each chapter thoroughly discusses each function, explaining how each is related to all the others. And the manual has a very detailed index—far better than any other (some don't have an index)—and there are clearly explained and detailed error codes. All of these are very important to people unfamiliar with financial analysis software.

TARGET is on the money as a simple financial planning tool with sophisticated features. And AMSI plans to introduce a full line of Business Planning System Modules in 1981, including a statistical analyzer, a business analyzer, a graphics pack-

FPL For Speed And Flexibility

Richard Cummings, Comptroller, Monterey National Bank, Monterey Park, Calif., had used time-sharing systems for several years before joining this new bank. Using a Pertec 2000 64K RAM with a dual floppy, he finds that the benefit has not been financial savings as much as speed and flexibility. "With our own software, we took three days to complete and 'fine tune' two spreadsheets; with FPL, it took me one day to put three model budgets online and one day to run the figures," he said. So in just two days, I had three first-run budgets on the president's desk.

"As important is it's flexibility. Most of our loans are tied to the prime rate, and as that changes, we need to reexamine our portfolio. With the software, we can do that by changing a few mnumbers and we can structure our reports the way we want them, and generate as much or as little information as we want on those reports," Cummings adds.

With time-sharing systems in particular, you are locked into the service's modeling format unless you want to pay for extensive software changes. Few take this route.

Underlying Cummings' comments are two more personal computer advantages: immediacy and continuous access. No one (in his right mind) stays hooked up to a time-sharing system all day long.

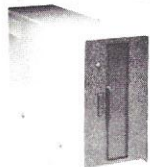
"Primarily, I use it to create and measure three budget plans—low, normal and high—and forecast and track the current year and produce balance sheets and income statements," he says.

Although Cummings had used time-sharing in the past, he had no previous experience with micros except one three-hour seminar. With author Dennis Brown's help and the manual, Cummings sat down at the terminal and created his model in two days. He notes, "Anyone with an accounting background will not find FPL that difficult at all."



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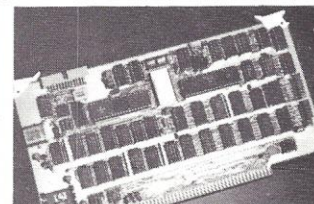
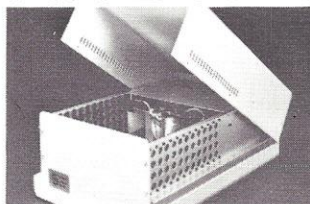
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Ohio Scientific has developed **PLANNER PLUS**, a capable financial modeling package for its C4P and C8P machines with at least 48K RAM. Its matrices are limited by the number of columns and rows one wishes to use, but the capacity is much greater than others of a similar price. The matrix size also depends on the size of the diskette used: 12 columns will give you 748 lines on minifloppies.

PLANNER PLUS: capable

PLANNER PLUS also uses a rule-based and row and column structure, but separate editors are added for each line, column or rule. Each rule has four components: operation, source, destination and range. The first is the function to be performed; the second identifies the numbers to be used and consists of a line/column intersection or a constant and a line or column; the third is a single line or column indicating where the results should be stored; and the fourth component is optional and specifies all of the lines and columns the operation carries over.

The package has four arithmetic operators, grow and fill functions, and average, total, minimum and maximum operators. It also has an easy-to-use consolidation utility and a flexible report generator.

The preliminary manual is well-organized, but the material is presented in an inconvenient format. Dave Loynd, product manager for Ohio Scientific, says the company is rapidly issuing new manuals, prepared by professionals, for all of its software.

All in all, **PLANNER PLUS** compares favorably with other packages in its price range.

EXECUPLAN: competitive

Vector Graphic's **EXECUPLAN** was written in-house by the company as an answer to VisiCalc. Overall, it compares favorably with VisiCalc,

and the \$150 price is the same as the first version of its chief competitor.

EXECUPLAN is based on a unique command structure and a flexible array structure that lets you set the matrix in any combination of rows and columns you like within the capacity of the disk drives. All commands are entered as two-digit codes and must be entered before any other information. The model is constructed line by line, with titles set first, title rows second and column width third, followed by text. Then rows are formatted. Text, columns and rows can be added at any time after that, but before formulas are entered. As formulas are entered, numbers or values are entered as part of the formula rows. The package includes 13 math operators, including standard deviations and trig functions, a built-in text editor and unlimited formatting.

The manual is split into two parts: a primer that uses a detailed tutorial approach and a reference guide that explains all of the commands, functions and operators in detail. There is a good error code section, but there is no index. All in all, the manual is too complex and would require a lot of detailed study to master. And even the error codes do not cover many simple mistakes.

FINPLAN for small business

From Hayden Software comes **FINPLAN**, intended as a financial planning and forecasting tool for small businesses. Designed by Robert C. Montgomery, it runs on a TRS-80 Level II 16K, single-disk system and costs \$69.95 on cassette tape and \$74.95 on disk.

The package comes in two modules. One is a fundamental model for financial projections and covers all important aspects of running a business; the second is used for more detailed analyses. And it provides sample data that lead a novice through the well-written 76-page manual. All of the program's functions are explained with a sample model.

FINPLAN generates projected balance sheets and earning statements in common business formats, can project up to five years of data and can calculate depreciation, return on investment and taxes. Within these parameters and the model, it allows a small-business owner to ask "what if" questions by changing external conditions and figures and then recalculating the results.

In short, **FINPLAN** gives small-business owners the formats for their most common business forecasting reports and projections. These include balance sheets, analysis ratios, a complete chart of accounts and projected earnings statements.

The second module does more difficult tasks, such as depreciation analyses, return on investment and tax calculations.

REPORT WRITER: takes practice

A \$149 product, **REPORT WRITER**, from Carolina Business Computers Inc., requires a 48K RAM CP/M system with Microsoft BASIC and an 80 to 132-column printer. It is a limited word and arithmetic calculation processor that can generate reports. The program has a maximum of 8 columns on an 80-character line or 13 columns on a 132-character line. It can have a maximum of 100 lines or rows, or 54 lines maximum on a 11-inch page.

It uses Reverse Polish Notation (RPN) as its arithmetic processor, the same type made popular by Hewlett-Packard with its hand-held calculators. This approach is very different from all other financial analysis software, and unless you are familiar with HP calculators, it will require a lot of practice. It also uses a different approach to commands, rules and operations. And the company says that **REPORT WRITER**'s recalculations are slow compared with those of other programs, taking several minutes to process relatively small reports.

Although the manual clearly ex-

FINANCIAL MODELING VENDORS' GUIDE

Company	Name/Cost	Configuration
Advanced Mgmt. Strategies Inc. P.O. Box 95130 Atlanta, GA 30347 Circle No. 168	TARGET \$195	48K Apple II Plus; SoftCard; Language System; CP/M 2.2; two drives. Or: 64K TRS-80 Model II; Lifeboat CP/M 2.2
Apple Computer 10260 Bandlely Dr. Cupertino, CA 95014 Circle No. 169	Decision Evaluator System \$400	48K Apple II Plus, one disk drive
	Plan 80 \$185	64K Apple II, Pascal, one drive
	Info. Analyst \$250	Apple III; AppleSOS, two drives
Carolina Bus. Comp., Inc. Oakwood Center 350 Third Ave., NW Hickory, NC 28601 Circle No. 170	REPORT WRITER \$149	Any 48K CP/M System; Microsoft BASIC
C4P, Inc./Lifeboat Assoc. 1651 Third Ave. New York, NY 10028 Circle No. 171	FPL \$99	48K CP/M system; 120K-byte drive, compiled version
Digital Marketing 2670 Cherry Lane Walnut Creek, CA 94596 415-938-2880 Circle No. 172	Plan 80 \$295	CP/M 1.4 and higher, one drive 56K or 64 TRS-80 Model II
Ferox Microsystems 5881 Leesburg Pike Falls Church VA 22041 (also—Addison-Wesley Pub. Reading, MA) Circle No. 173	RCS \$1,500	64K Apple II Plus; 3 disk drives; Pascal language card; TI 810 printer
Financial Planning Assoc. (sold by WESTICO, Inc.) 25 Van Zant St. Norwalk, CT 06855 Circle No. 174	MINIMODEL \$495	48K CP/M; CBASIC 2
Hayden Publishing 50 Essex St. Rochelle Park, NJ 07662 Circle No. 175	FINPLAN \$69.95/cassette \$74.95/disk	TRS-80 16K; cassette or disk based
Lifeboat Associates 1651 Third Ave. New York, NY 10028 Circle No. 176	T-MAKER \$150	48K CP/M systems: two disk drives
Ohio Scientific 1333 S. Chillicothe Aurora, OH 44202 Circle No. 177	PLANNER PLUS \$200	OSI C4P or C8P; two disk drives
Personal Software 1330 Bordeaux Dr. Sunnyvale, CA 94086 Circle No. 178	VISICALC \$99 to \$299	Apple II 48K; 48K Atari 800; CBM 32K; HP-85; TRS-80 Model II and III
	DESKTOP/PLAN II \$195	Apple II 48K
Spectrum Software 142 Carlow P.O. Box 2084 Sunnyvale, CA 94087 Circle No. 179	Universal Computing Machine \$99	32K Apple II with Applesoft in ROM; DOS version 3.2, 32K TRS-80 Model I; TRSDOS version 2.3
Vector Graphic 31364 Via Colinas Westlake Village, CA 91362 Circle No. 180	EXECUPLAN \$150	Vector Graphic VIP, System B or 3000; two drives

plains RPN and each function and command within the menu, it fails to provide a complete and understandable example of how to build a model or prepare reports with the system. The demonstration model is unnecessarily repetitive and lacking in links between steps.

COL-U-PAD: small but easy

Electronics Technology's COL-U-PAD is a small but easy-to-use matrix processor that costs \$99.95. It operates on any 32K Commodore PET or CBM computer with a disk.

Its matrix is limited to 24 columns and 40 rows, but it has many standard features. It has 15 math functions or instructions, all of which are executed in simple left to right algebraic operations.

COL-U-PAD's manual provides thorough, simple instructions, as far as they go, but the examples are sparse. Sample pages of results are needed. In short, COL-U-PAD has a number of interesting features, but it is limited by its small size and lack of replication features. On a good note, company officials say the manual is being revised.

Spectrum Software's Universal Computing Machine uses a 45-row-45-column table that can be changed from 10 columns and 200 rows to 200 columns and 10 rows. It runs on an Apple II or II Plus with at least 32K RAM; APPLESOFT in ROM; the 3.2 version of DOS; or a 32-48K TRS-80 Model I, Level II with TRSDOS 2.3.

The program is based on row, column and function logic, and it has nine equation and math operators, including carry-forward and user-defined functions. It has a cursor-based screen editor that makes "what if" analysis fairly easy.

What makes the Universal Computing Machine different is its companion, Universal Business Machine. The latter is a portfolio of eight standard business planning forms: bal-

continued on page 108



Atari graphics and sound stand in a class by themselves."

David D. Thornburg
Compute Magazine, November/December 1980

"Its superiority lies in three areas: drawing fancy pictures (in color), playing music, and printing English characters onto the screen. Though the Apple can do all these things, Atari does them better."

Russell Walter
"Underground
Guide to Buying a
Computer"
Published 1980,
SCELBI Publications

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CIRCLE 37

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"The Atari machine is the most extraordinary computer graphics box ever made..."

Ted Nelson
Creative Computing Magazine, June 1980

"...so well packaged that it is the first personal computer I've used that I'm willing to set up in the living room."

Ken Skier, OnComputing, Inc. Summer 1980

"...well constructed, sleekly designed and user-friendly—expect reliable equipment, and strong maintenance and software support."

Videoplay
December, 1980



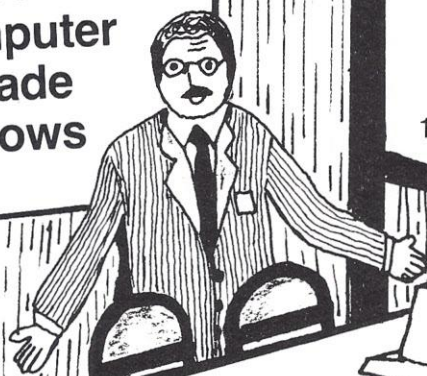
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- 5 Pittsburgh, Pennsylvania — October 1-3
- 6 St. Louis, Missouri — October 15-17
- 7 Dallas, Texas — October 22-24
- 8 Los Angeles, California — November 8-10
- 9 San Francisco, California — November 19-21
- 10 Denver, Colorado — December 3-5

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Note - Because of limited space availability, an early reservation is recommended to assure you of space.

Personal Computers

continued from page 15

metic is available in integer, floating-point, octal and hexadecimal modes to a maximum of 16 significant figures.

Probably the PC-8001's most impressive feature is its color and graphics capabilities. Simple commands set up color registers allowing color control over any of the points on the screen (160 by 100). Eight colors are available. Graphics and text can be freely interspersed on the screen with text size controlled through software. The screen can be set to display 36, 40, 72 and 80 characters per line and 20 or 25 lines per screen.

The price of the system and its formal release date in the United States have not yet been announced. The PC-8001 is more of a business computer than a game machine but its features will lend themselves to any use that a personal computer can be put.

Northstar

The NorthStar Horizon, introduced in 1977, developed as a computer that was designed around a disk drive subsystem. In 1976, the original company marketed software and an operating system for the Shugart 5¼ Some minifloppy disk drive. The company became very successful, built a computer for the subsystem, and now sells complete systems that serve primarily in scientific and business applications—some are in education, and a relative few are used by hobbyists.

The Horizon is a Z-80 based, S-100 compatible machine which means that a lot of compatible software and hardware is available.

The system houses a 12-slot chassis and two built-in Shugart minifloppies. As an option, you can get dual-sided, quad-capacity drives (360K storage on each diskette). By attaching four of these units to a Horizon, you have approximately 1.4 million bytes of on-line data storage available.

Memory for a Horizon ranges



The PMC-80 from Personal Micro Computers Inc. is compatible with the TRS-80 Model I computer. It can be used with Radio Shack peripherals.

from 32K to 56K. Languages include BASIC, Pascal, FORTRAN and COBOL. The unit has a disk operating system and a sophisticated monitor, and is capable of running Digital Research's CP/M. NorthStar offers several models of printers with their systems.

Prices for systems range from \$3,500 to \$8,000.

Although NorthStar's BASIC isn't completely compatible with the Microsoft BASIC found on many of the packaged computer systems, it is powerful in its own right.

The Horizon is a versatile system but one that requires some degree of computer sophistication to be able to get the most out of the machine. If you are interested in a computer as a tool to solve a business problem, the Horizon has a lot to offer. If you aren't prepared to learn about computers and their operation, you had better get to know someone (whether the person be a NorthStar representative or an independent individual) who is familiar with the machines to take care of the problems that crop up in the operation of a sophisticated machine.

Personal Micro Computers

Personal Micro Computers, Inc., introduced its PMC-80 at the 1980

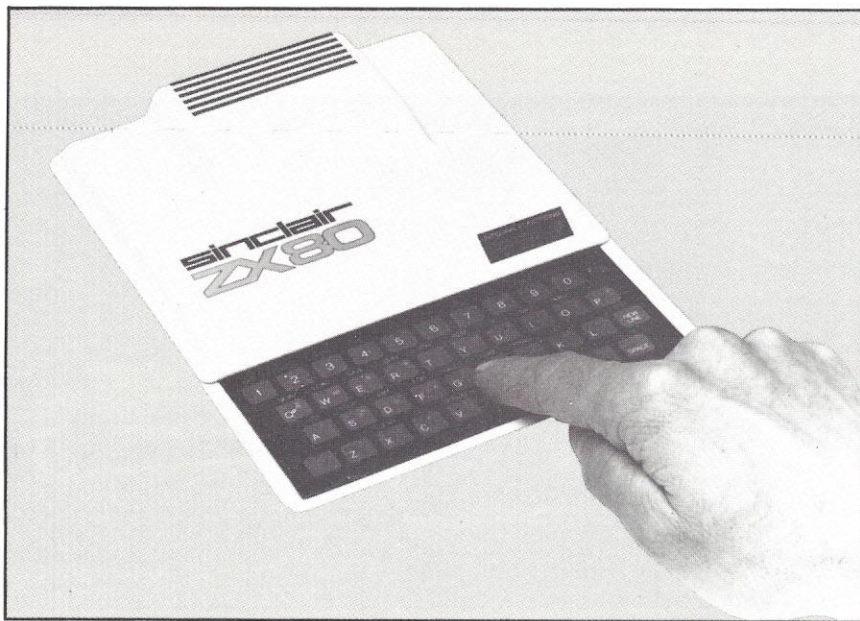
National Computer Conference. At that time, the firm highlighted the fact that the PMC-80 was hardware and software compatible with the popular Radio Shack TRS-80 Model I.

The PMC-80 offers a range of configurations that give consumers a way to grow from a basic entry level system to a complete 48K Random Access Memory (RAM) unit capable of communicating with modems, printers, minifloppies and a variety of other hardware items.

The entry level system, priced around \$675, has an integrated cassette tape recorder for program storage, 16K bytes of Random Access Memory (RAM), Level II Microsoft BASIC interpreter in Read Only Memory (ROM), power supply and keyboard in a single cabinet. The PMC-80 displays on either a monitor or on a standard television set by using a built-in VHF Channel 3 modulator.

All software available for the TRS-80 operates in the PMC-80 and both Level II and System programs load into the machine without the volume adjustments often necessary with the TRS-80. Peripherals designed for the Radio Shack parallel port interface to the PMC-80's

MICROCOMPUTER ROUND-UP



The ZX80 computer from Sinclair Research Ltd. is a book-sized computer that can be connected to any television set. It sells for less than \$200.

50-pin bus through a 40-pin interface available from Personal Micro Computers.

Disk based programs can run on the PMC-80 using a Radio Shack Expansion Interface unit or commercially available equivalent. With the expansion interface, all peripherals designed for the TRS-80 are also compatible with the PMC-80 including Winchester disks, speech recognition devices, printers, etc. Personal Micro Computers, Inc., recently introduced its own PMC-80 Expander (Model EXP-100) which can provide 32K bytes of RAM expansion, minifloppy disk interfaces for up to four drives, a Centronics-compatible parallel printer interface, RS-232-C communications interface, plus a slot for an S-100 board. An upper-end system retails for approximately \$3,000.

Sinclair ZX80

The cheapest computer available to date, is the ZX80 from Sinclair Research Ltd.

Although the ZX80, priced at less than \$200, can't match the performance of an Apple II or Commodore PET, it can deliver considerable computer power for its price. Its major features include small size (only

6 1/2" by 8 1/2" by 1 1/2"), fast microprocessor speed (3.25 MHz clock frequency), simplified program entry using single-stroke keywords, and automatic syntax checking.

Of course it has its drawbacks too. Memory size is limited (only 1K programmable static memory) and its tiny keyboard is rather awkward to operate. The ZX80 BASIC is limited due to its cramped 4K ROM, and

screen blanking during program execution can be annoying. But, for the novice interested in "hands-on" experience with his own personal computer, the ZX80 is hard to beat.

The heart of the Sinclair ZX80 is a NEC 780-1 microprocessor, a Japanese version of the Z80. The tasks assigned to this chip include performing all instructions, or calculations, accepting inputs from the keyboard, and controlling the video display. The ZX80 does not contain a video display chip; the CPU updates or refreshes the TV screen 60 times a second while it waits for the user to input the keyboard. When a key is hit, the screen will flash as the processor leaves the display function to check what is entered; during lengthy calculations, the screen will go blank while the processor is executing its specified instructions.

The 40-key keyboard is made of tough plastic, waterproof, with key symbols printed on its underside to prevent the words and symbols from being rubbed off. However, the touch-sensitive keyboard is small and one-finger touch-typing is the only way many users will find comfortable.

The 9-volt external power supply is similar to the popular types furnished with tape recorders and radios. To interface with the external

Need More Information?

For more information on individual small computers systems, readers may contact the manufacturers listed here by circling the appropriate numbers on the reader-service card.

Altos Computer Systems, 2360 Bering Dr., San Jose, CA 95131; (408) 244-5766. **Circle No. 158**

Cromemco Incorporated, 280 Bernardo Ave., Mountain View, CA 94043; (415) 964-7400. **Circle No. 159**

Exidy Inc., Data Products Division, 390 Java Dr., Sunnyvale, CA 94086; (408) 734-9401. **Circle No. 160**

Intelligent Systems Corporation, Intecolor Dr., 255 Technology Park/Atlanta, Norcross, GA 30092; (404) 449-5961. **Circle No. 161**

Intertec Data Systems Corporation, 2300 Broad River Rd., Columbia, SC 29210; (803) 798-9100. **Circle No. 162**

Mattel Electronics, Mattel Inc., 5150 Rosecrans Ave., Hawthorne, CA 90250; (213) 644-0411. **Circle No. 163**

NEC America, Inc., 130 Martin Lane, Elk Grove Village, IL 60007. **Circle No. 164**

NorthStar Computers, 2547 Ninth St., Berkeley, CA 94710; (415) 549-0858. **Circle No. 165**

Personal Micro Computers Incorporated, 475 Ellis St., Mountain View, CA 94043; (415) 962-0220. **Circle No. 166**

Sinclair Research Ltd., 475 Main St., P.O. Box 3027, Wallingford, CT 06492; (203) 265-9171. **Circle No. 167**

world, the ZX80 contains two 3.5mm plug sockets for the cassette recorder, a phono socket to connect the ZX80 to a TV set (cable furnished), and a 50-pin edge connector for expansion of the system.


The BASIC interpreter, character set, editor and operating system are contained in the 4K ROM. Sinclair claims an 8K BASIC ROM will be available within a few months, and also expects to offer a 16K programmable-memory plug-in module for under \$100.

Sinclair BASIC includes 34 statements, functions and commands as well as PEEK, POKE, USR and EDIT. With POKE, the user can write machine code; the USR function permits BASIC to call the machine code; EDIT allows access to any line in the program when simple alterations are required; PEEK offers access to any part of the memory. An interesting feature of the ZX80 is the ability to enter many of the BASIC keywords with a simple keystroke, reducing the programmer's typing effort and saving space in the 1K RAM. Although many of the keywords appear above letters and numerals on the keypad, the ZX80 automatically senses when a keyword is expected rather than a letter. For example, immediately after a line number is typed, the system expects a statement; thus, if the key bearing the letter O and the keyword PRINT is hit, the system would not display an O but would be prepared for the keyword and display PRINT.

The ZX80 is well suited for the novice who wishes to learn basic programming concepts. The limited language is actually a benefit since there is less to be confused with. A cursor is always present to prompt the novice.

A 128-page "Course in BASIC Computing" is included. For every chapter of theory, there is a chapter of practice. Although the pocket-size booklet is written in a rather informal style, there have been mixed reviews on its quality. Novices, who would appear to constitute a major-

ity of Sinclair's low-cost ZX80 market, can soon become bewildered by semi-technical jargon. Experts evaluating the ZX80 have been confused by details of the memory maps, the use of POKE to write machine-language programs, run-

ning machine-code programs with USR, and determining the proper level for loading cassette tapes. However, the manual is thorough and armed with a strong determination, a user can gain a healthy programming background. 

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		LIST	CCA	QTY
1 SOFTWARE APPLICATIONS	<input type="checkbox"/> <i>Visicalc</i> ™ by Personal Software	\$150	\$ 99*	
	<input type="checkbox"/> <i>WordStar</i> ™ by MicroPro™	495	315	
	<input type="checkbox"/> <i>EasyWriter "Pro"</i> by IUS	275	225	
	<input type="checkbox"/> <i>Magic Wand</i> ™ by SBA	400	275	
2 EXPANSION ACCESSORIES	<input type="checkbox"/> <i>Microsoft Z-80® Softcard</i> ™	\$349	\$255	
	<input type="checkbox"/> <i>Micromodem</i> ™ II by Hayes™	379	299	
	<input type="checkbox"/> <i>Videoterm</i> by Videx	345	275	
	<input type="checkbox"/> <i>Sup-r-terminal</i> by M&R	375	319	
3 PERIPHERALS & DEVICES	<input type="checkbox"/> <i>MX 80</i> ™ by Epson	\$645	\$499	
	<input type="checkbox"/> <i>737-Parallel</i> by Centronics	995	749	
	<input type="checkbox"/> <i>460G "Paper Tiger"</i> by IDS	1,394	1,125	
	<input type="checkbox"/> <i>Expansion Chassis</i> by Mountain	650	549	

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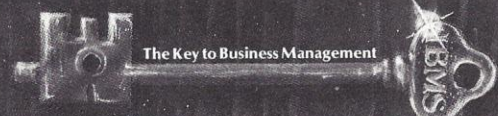
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SOFTWARE UPDATE

Four New Business Programs

After having proven with its VisiCalc™ program, that there is a tremendous market for business software that runs on personal computers, Personal Software has introduced four new business software packages.

The new software products include the VisiPlot™ program, a high-resolution plotting and graphics package; the VisiDex™ program, highly flexible and personal information system; the VisiTrend/VisiPlot™ program, a combination of VisiPlot graphics and a program for time-series manipulation trend forecasting and descriptive statistics; and the VisiTerm™ program, which allows a personal computer to communicate with a variety of computers ranging from mainframes to micros.

Also being introduced is an enhanced version of VisiCalc. Compatible with Apple's 16 sector disk storage format, the updated VisiCalc features 17 new commands and operations.

A major feature of the new series of programs is the ability to pass information between each other.

With VisiTerm, data files from

VisiCalc, VisiPlot, VisiTrend/VisiPlot, or VisiDex, can be sent between computers. VisiTerm can also act as a terminal for accessing large computer systems or for allowing one personal computer to transfer information to another.

VisiTerm allows easy configuration of the program. Such details as baud rate, parity, stop bit and other features may be quickly changed and saved. In addition, the user may simply define his or her own character sets. The program comes with regular, boldface and APL characters, but many others are also possible.

To get a graphic look at your data VisiPlot can be used to produce high-resolution graphs and charts in six different formats and six different colors automatically.

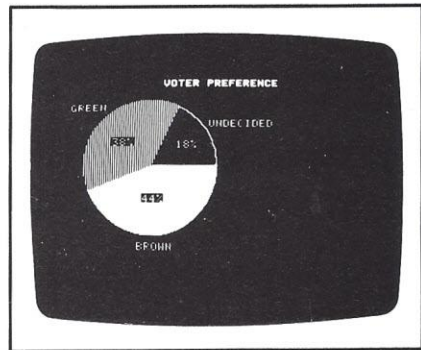
VisiPlot can use numerical data entered directly or can accept data from the newest version of VisiCalc. VisiPlot is able to produce: bar graphs, time series line plots; area charts; pie charts, hi-low charts and scatter charts.

The VisiTrend/VisiPlot program combines the power of the VisiPlot high-resolution plotting program with a sophisticated statistical and trend forecasting package.

Specifically, it allows users to: perform multiple linear regression and trendline forecasting; transformation on data series; cumulatively total data values; generate fitted and residual series; moving average; smoothing; and lead/lag and percent change.

The third program in this new series is VisiDex, which can store and retrieve information on a screen in a free-form unstructured way.

The user types information onto the computer display screen. The information is then stored on diskette



Sample output from the VisiPlot illustrates bold face type and shading.

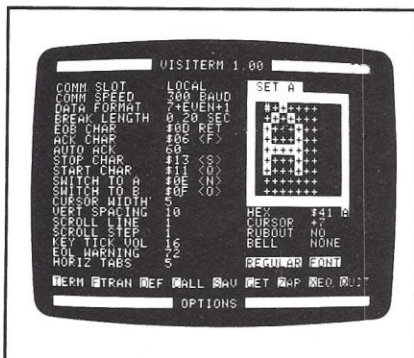
and can be called back by giving the program a date or "keyword" which the user has previously associated with the information on the screen. As many as 36 six-letter keywords may be used to reference a single screen of information.

The last program in this series is an enhanced version of VisiCalc. New features of the program include a full implementation of the Data Interchange Format™, which is a program independent data storage format, and 17 new commands which make setting up a VisiCalc worksheet much easier.

Among the new commands are Edit, which allows the user to edit a formula without having to retype it; and Choose, which allows the choice of a particular element within a list, based on the result of another calculation.

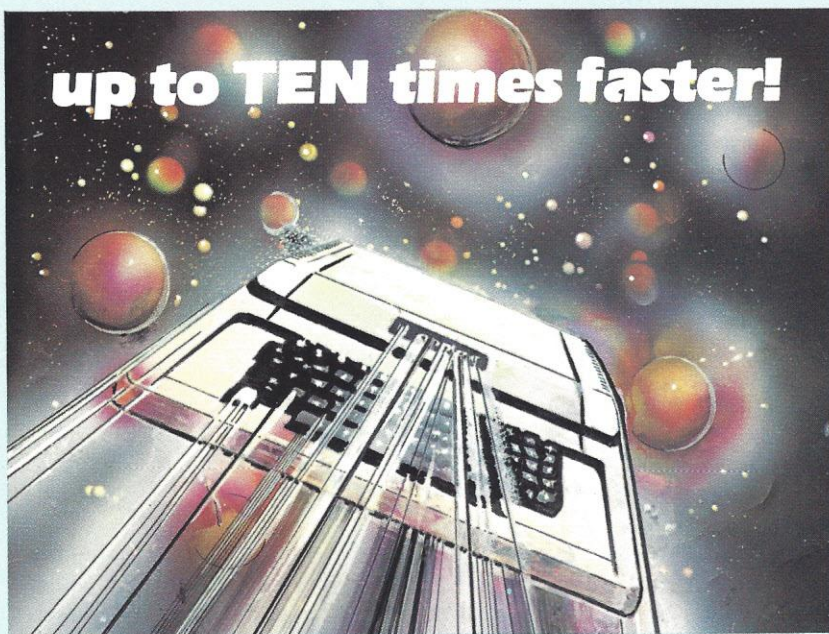
Suggested retail prices are: VisiDex, \$199.95; VisiPlot, \$179.95; VisiTrend/VisiPlot, \$259.95; VisiTerm, \$149.95; VisiCalc, \$199.95. For more information contact Personal Software, 1330 Bordeaux Drive, Sunnyvale, CA 94086.

Circle No. 101 continued on page 80



The user can match VisiTerm to the requirements of virtually any host computer by changing baud rate, parity and stop bits.

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<input type="checkbox"/> 01105	<input type="checkbox"/> 01407	<input type="checkbox"/> 02701	<input type="checkbox"/> 03401	<input type="checkbox"/> 03444	<input type="checkbox"/> 04503	<input type="checkbox"/> 05103	<input type="checkbox"/> 05601	<input type="checkbox"/> 07101	<input type="checkbox"/> 09409
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UTILITY

LINE & VARIABLE CROSS REFERENCE

GENERATOR (Johnson) Provides a cross-reference of line numbers and variable names. **07301, PET tape, \$16.95**

APPLESOFT UTILITY PROGRAMS (Gilder) Increase your BASIC programming speed and flexibility. Contains 9 useful subroutines: 1. REM Writer 2. PRINT Writer 3. POKE Writer 4. Hexadecimal/Decimal Converter 5. Line Counter 6. Renumber 7. Append 8. Byte Counter 9. Slow List/Stop List **03504, Apple II tape, \$29.95**

RENUMBER & APPEND: Utility Programs for the Apple (Gilder) Renumber your Applesoft program and append a second program to the one in memory. **03804, Apple II tape, \$14.95**

REVIVE (Gilder) When a program is accidentally erased, REVIVE searches through memory and finds the information that enables it to restore the pointers that have been changed. **03604, Apple II tape, \$19.95**

SLOW LIST/STOP LIST: Utility Programs for the Apple (Gilder) Start, stop, and control the speed of your program with Apple II's game paddles. **03904, Apple II tape, \$10.95**

PSEUDODISK (Neuschatz) This money-saving program simulates a disk memory system for Integer BASIC programs. It allows multiple programs in memory at the same time which can be run from a catalog. **04804, APPLE II tape, \$24.95**

6502 DISASSEMBLER (Stamm) Produce assembly language source files with labeled subroutines and references from programs already in memory. It is compatible with Hayden's ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM. **08609, APPLE II Disk, \$39.95**

DISK CERTIFIER AND COPIER (Jacc Inc.) A handy utility program that certifies the acceptability of blank diskettes and rejects those with flaws. It also includes a fast machine language disk copying program that will work on single and dual drive systems. **07809, APPLE II Disk, \$19.95**

DISK CATALOGER (LeBar) Automatically maintains a cross-reference listing of all your programs, their location by disk number, their function and use. Catalogs, lists and sorts programs. **05203, TRS-80 Level II tape, \$16.95; 05208, TRS-80 Level II Disk, \$21.95**

BUSINESS

★ ★ **HISTO-GRAPH** (Boyd) A calendar-based histogram or bar-graph production system. Allows the user to enter numeric data that relates to a date, and reproduces that data as a high-resolution histogram. **09009, Apple II Disk, \$29.95**

FINPLAN: A Financial Planning Program for Small Businesses (Montgomery) Allows you to enter data from a balance sheet into the program, to make assumptions about the future growth of business, and to have the computer project results for up to a five year period based on those assumptions. And if you change any data, the program revises all resulting data automatically. The disk version can be used only with TRSDOS version 2.3. **05103, TRS-80 Level II tape, \$69.95; 05108, TRS-80 Level II Disk Version, \$74.95**

★ ★ Denotes New Program

DATA MANAGER: A Data Base Management System and Mailing List (Lutus) Store information on a floppy disk, and retrieve it quickly and easily by specific names, or by category. **04909, Apple II Disk Version, \$49.95.**

MAILING LIST (Tru-Data Software) Lists addresses, prints labels, allows for alterations and deletions, and has the capacity to make duplicate data file disks. Can only be used with version 1.5.
05713, Heath Disk \$49.95

GAMES

SARGON II (Spracklen) The first great computer chess program! "...an excellent program which will provide true challenge for many players...Save your money and buy SARGON II..." **'80 Software Critique. 03403, TRS-80 Level II; 03404, Apple II; 03410, OSI C1P; 03440, OSI C4P; each tape \$29.95. 03408, TRS-80 Level II Disk; 03409, Apple II Disk; 03414, OSI C1P Disk; 03444, OSI C4P Disk; 03484, C8P Disk; each disk \$34.95**

BLACKJACK MASTER: A Simulator/Tutor/Game (Wazaney) A serious game that performs complex simulations and evaluations of playing and betting strategies. **05303, TRS-80 Level II tape, \$24.95; 05308, TRS-80 Disk Version, \$29.95**

MICROSAIL (Johnson) A true test of your nautical skills as you race against wind, tides, and time.
04401, PET tape, \$11.95

GRIDIRON: A Microfootball Game (Microflair Associates) Be both offensive and defensive quarterbacks. Includes time-outs, penalties, and the two-point conversion option used in college football.
03304, TRS-80 Level II tape, \$12.95

MAYDAY (Breitenbach) Out of fuel! Try to avoid crashing with this challenging airplane flight simulation.
02601, PET tape, \$9.95

REVERSAL (Spracklen) Winner of the software division of the **First International Man-Machine OTHELLO™ Tournament**, this version of the 200-year old game Reversi, features 27 levels of play and high-resolution color graphics. **07004, APPLE II tape, \$29.95; 07009, APPLE II Disk, \$34.95**

STARCLASH (Walton) An exciting game of galactic strategy for one or two players.
05903, TRS-80 Level II tape, \$16.95

ROYAL FLUSH: Competitive Poker Solitaire (Wazaney) A game you can play alone or with any number of players. High score wins in this poker-based, fun-filled card game. Choose from possible game variations. **07101, PET; 07103, TRS-80 Level II, each tape, \$14.95**

BACKGAMMON (Wazaney) A classic game of skill and luck played against a preprogrammed opponent. **02501, PET; 02503, TRS-80 Level II; each tape, \$10.95**

BATTER UP!!: A Microbaseball Game (Savon) Action-packed baseball with 3 levels of play. **02801, PET; 02803, TRS-80 Level II; each tape, \$10.95**

LANGUAGE

PROGRAMMING IN APPLE II™ INTEGER BASIC: Self-Teaching Software (Banks & Coan) Teach yourself Apple Integer BASIC and control your own progress at all times with this interactive programmed instruction format. **05004, Apple II, tape, \$29.95; 05009, Apple II Disk Version, \$39.95**

APPLE II™ ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM: An Assembler/Editor/Formatter (Lutus) Write and modify your machine language programs quickly and easily. **04609, Apple II Disk Version, \$39.95.**

SUPER APPLE II™ BASIC (Lutus) A structured BASIC that compiles into an optimized Applesoft or Integer BASIC program. **05409, Apple II Disk, \$39.95**

Super FORTH (Bugbee) This is a fast, high-level, expandable language that features integer and floating-point math, high-resolution graphics and string handling capability. **05509, APPLE II Disk, \$49.95**

ENGINEERING

★ ★ **OP-AMP DESIGN** (Gabrielson) Provides the necessary values for your design and will suggest appropriate op-amp types. Includes a choice of six op-amps, and the program will then determine if your selection of an op-amp will be acceptable within your chosen parameters. Can be updated to accommodate future op-amps. **09704, Apple II tape, \$16.95**

★ ★ **DOUBLE PRECISION FLOATING POINT FOR APPLE II™** (S-C Software) Extends the accuracy of the arithmetic available on the Apple from nine digits to a full 21-digit precision on all functions in Applesoft compatible format. **09409, Apple II Disk, \$49.95**

MCAP: A Microcomputer Circuit Analysis Program (Savon) Performs a linear voltage, impedance, or transfer impedance analysis of an electronic circuit. **04501, PET; 04503, TRS-80 Level II; 04504, Apple II; each tape \$24.95; 04513, Heathkit/Zenith Disk, \$29.95**

ENGINEERING MATHEMATICS-1 (Gilder) Contains eight programs useful to the engineer: 1. Solving Simultaneous Equations 2. Evaluation of a Polynomial 3. Quadratic Equations 4. Integration by Simpson's Rule 5. Newton-Raphson Roots 6. Derivative of a Function 7. Factorial of a Given Number 8. Extended Factorial Calculation. **01301, PET; 01303, TRS-80 Level II; 01304, Apple II; each tape \$14.95**

MICROCOMPUTER AIDED DESIGN OF ACTIVE FILTERS (Gilder) Eight programs that simplify the design of active filters and will calculate the component values needed for various bandpass, low-pass, and notch-type filters. **01401, PET; 01403, TRS-80 Level II; 01404, Apple II; 01407, Heath; each tape \$16.95; 01413, Heathkit/Zenith Disk Version, \$21.95**

EDUCATION

CROSSBOW (Breitenbach) Features a target game that, besides offering hours of fun, teaches fractions in an exciting and competitive environment. An educational program for all ages. **02701, PET tape, \$9.95**

GENERAL MATHEMATICS-1 (Gilder) Contains 15 programs useful to anyone who wants to improve their math skills and accelerate their computation. The fifteen programs are: 1. Log to Any Base 2. New Coordinates 3. Rectangular/Polar Coordinates 4. Permutations 5. Combinations 6. Vector Cross-Products 7. Vector Scalar Products 8. Max/Min Locator 9. Number Rounder 10. Dimension Scaler 11. Histogram 12. Circle Finder 13. Nth Root of a Number 14. Normally Distributed Random Numbers 15. Rational Fractions. **01101, PET; 01103, TRS-80 Level II; 01104, Apple II; 01105, Sorcerer; each tape \$14.95**

COMPLEX MATHEMATICS (Gilder) Contains 8 programs that give the user the ability to perform computations of complex numbers in BASIC rather than in FORTRAN. The eight programs are: 1. Absolute Value 2. Complex Subtraction 4. Complex Multiplication 5. Complex Division 6. Nth Roots of a Complex Number 7. Complex Exponential 8. Complex Number to a Real Power. **01201, PET; 01203, TRS-80 Level II; 01204, Apple II; each tape \$14.95**

AT HOME

ENERGY MISER (SuperSoft Associates) A complete heating/cooling analysis program for your home or office that will calculate heat loss or gain due to poor insulation, leaky doors and windows, and more. **05601 PET; 05603, TRS-80 Level II; each tape \$29.95; 05609, Apple II Disk Version; 05613, Heathkit/Zenith Disk Version; \$29.95**

PERSONAL PROPERTY INVENTORY (Southern Systems) Here's an easy-to-use program that lets you develop, maintain, sort and save an inventory of your personal property.
08903, TRS-80 Level II tape, \$14.95

GENERAL INTEREST

★ ★ **DATA-GRAPH** (Boyd) Aids in the preparation of graphs and charts. Numeric data can be entered into Data-Graph and used to create colorful one-, two-, or four-quadrant graphs. **09109, Apple II Disk, \$49.95**

SONGS IN THE KEY OF APPLE (Lopatin) Allows you to see and hear your favorite tunes, pre-programmed tunes or music you create (up to 200 notes, including rests, per musical piece).
03304, Apple II tape, \$10.95

SKETCHMODE (Walton) Create computer graphics, modify them, save them, and read them from tape.
03203, TRS-80 Level II tape, \$11.95

KEYNOTE (Microflair Associates) Hear any type of music in slow, medium, or fast tempo. **02903, TRS-80 Level II tape, \$9.95**

BIOCURVE (Microflair Associates) Charts your bio-rhythms against another person's and suggests when you will be in a state of instability and therefore vulnerability. **03103, TRS-80 Level II tape, \$9.95**

THE FIRST BOOK OF KIM, 3 Tapes (Butterfield, Ockers, and Rehnke) Three cassettes featuring 28 recreational and 13 utility and diagnostic programs. **00700, KIM-1 (14 recreational programs); 00800, KIM-1 (14 recreational programs); 00900, KIM-1 (13 utility programs); each tape \$9.95**

MICROTYPING (Engel) Features the "touch method" of learning to type for improving your computer skills. **02401, PET; 02403, TRS-80 Level II; 02404, Apple II; each tape \$10.95**

Available at your
local computer store!

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SOFTWARE UPDATE

continued from page 77

BUSINESS

Business Manager

When it comes to efficiency and having control of a business, the small businessperson can't afford inefficiency. That's why Programma International has developed IBMS, its new Interactive Business Management System.

IBMS is a no-nonsense, hard-nosed system that allows a small company with an Apple II computer to enjoy the benefits, effectiveness and control that were once reserved for larger computers, the company said. It took three years to develop IBMS as a turn-key system, including shake down and on-site testing. As a result it is easy to understand and use, and is backed by readable, "beginner proof" documentation, the firm added.

There are currently nine modules, all interactive, so an entry made in one area automatically updates all related areas. Included in the program menu are Accounts Receivable, Perpetual Inventory, Accounts Payable, Payroll, General Ledger, Mailing labels and more.

The IBMS on mini-floppies is offered for a limited time at the introductory price of \$1495 at local computer stores or it may be purchased directly from Programma International, Inc., 2908 N. Naomi St., Burbank, CA 91504; (800) 423-2978. *Circle No. 102.*

Financial Planning

Westico announces the availability of a new microcomputer program for financial planning—MINIMODEL. The program runs on such computers as the TRS-80 Model II, Cromenco, North Star, and others

which use a CP/M-like operating system.

MINIMODEL is for answering those "what if?" questions raised in cash flow projections, financial forecasting, venture analysis, long range planning, project planning, risk analysis, and more. This new software can be run on microcomputers that cost one tenth as much as dedicated financial planning computer systems.

Features include a model size limited only by disk space, model time horizon that can be advanced to eliminate old data, models that can be consolidated into a higher level model, and consolidated models that can be processed under their own set of rules. Model details may be printed or displayed, and output report content and formats are flexible under user control.

MINIMODEL is priced at \$495. Documentation alone is \$50. For

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more information contact Westico, Inc., 25 Van Zant St., Norwalk, CT 06855; (203) 853-6880.
Circle No. 103.

UTILITY

Index Disk Files

Programs Unlimited announces an easy way to organize your programs: DIRINDEX.

A disk utility program that maintains an ongoing, updated index of all user files for a 32 or 48K Model I TRS-80, DIRINDEX produces an index of individual listings that identifies the file by name/extension, indicates the size of the file in grans, and specifies a diskette number and name. The indexed listing also informs you of the side of the diskette that the program is located on and gives you the correct number of free grans left on a side.

DIRINDEX offers easy deletion of individual files or entire diskettes, plus full search capability in listing files. You can list files to screen or to line printer and have the index prepared in alphabetical order by file name. An index can also be numerical order by diskette number.

DIRINDEX uses machine language to read the standard directory track, plus a machine language routine to sort all files. The program is instructed not to index "invisible" or "system files." The 32K system handles 413 entries and 45 diskettes, while the 48K system can handle up to 1200 entries and as many as 100 diskettes, including both sides. DIRINDEX, which sells for \$19.95, runs on one drive.

For more information contact Programs Unlimited, Inc., 125 South Service Rd., Jericho, NY 11753; (800) 645-6038.

Circle No. 104.

Compiler for CP/M

DATABS, a data abstraction language, is now available for 8080 microprocessors. The compiler runs under the CP/M (from Digital Research) disk operating system. DATABS, suitable for control and systems programming, was inspired by the CLU language developed at the Massachusetts Institute of Technology.

The built-in types of DATABS are boolean, character, single-byte integer, double-byte integer and string. Data abstractions allow the implementation of user-defined types using a dynamic storage mechanism.

Data abstractions are a step beyond structured programming. Programs created using data abstractions are easier to design, understand and modify.

DATABS supports UNIX+-style command line arguments and I/O

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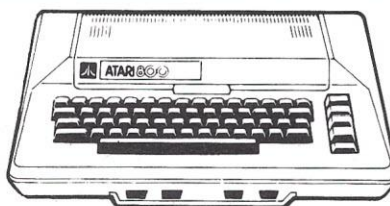
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Software

EBS Accounts Receivable Inventory System	\$595
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825 Printer	759	CX4108 Hangman	13
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850 Interface Module	164	CXL4010 3D TicTacToe	30
Microtek 16K RAM	99	CXL4005 Video Easel	30
Microtek 32K RAM	179	CXL4104 Mailing List	17
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CXL4004 Basketball	30	CX4101 Invit. To Programming	17
CX4105 Blackjack	13	CXL4015 TeleLink	20
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SOFTWARE UPDATE

redirection with < and >. A stream abstraction allows terminal and disk input/output.

A least a 40K system is required. For the introductory price of \$49.95, you get a CP/M-compatible 8" disk containing the compiler, built-in type and run-time support library, stream abstraction, and command line processor along with the 52-page DATABS User's Manual. New Jersey residents please add 5% sales tax. For more information contact Softronics, 36 Homestead Lane, Roosevelt, N.J. 08555.

Circle No. 105.

SYSTEM

APL for Apple

Vanguard Systems Corporation is now supplying owners of Apple computers with APL for \$500. This

new Apple version of Vanguard's APL/V80 requires CP/M, Microsoft's Z-80 Soft Card, and a 24 x 80 video card. If the user can use mnemonic symbols rather than the actual APL character set, a version is available which does not require a video card.

Vanguard's Apple APL/V80 includes: 11 APL arithmetic functions, 11 Boolean and relational functions, 11 selectional and structural functions, and 9 general functions.

General functions include execute and format. The language also contains system variables and system functions, such as canonical representation, function fix, share offer, and share retract. System commands such as copy and erase may be executed from functions, the company said.

APL/V80 has disk-based workspace and copy-object libraries, and

supports arrays up to eight dimensions. The software provides dynamic execution of system commands, canonical representation and function fix, and can use latent expression. There is an auxiliary processor for interfacing I/O ports, and one for indexed file systems. APL/V80 allows booting directly into an application program from system power-on.

To enhance the immediate usefulness of APL/V80 for Apple owners, Vanguard Systems is offering as separate options four different applications packages: Simulation of APL*PLUS file system, keyed Indexed Sequential Access Method (ISAM), Text Editor, and Check Management. Full information about APL/V80 for the Apple is available from Vanguard Systems Corp., 6901 Blanco, San Antonio, TX 78216.

Circle No. 106.

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- Allows up to 4 Mod II's to connect to a single controller — up to 4 hard disk drives per controller. Users may access the same file simultaneously (first-come first-served).
- Uses Cameo controller and standard 10-megabyte cartridge (hard) disk drives along with RACET Hard/Soft Disk System (HSD) software.
- Access times 3 to 8 times faster than floppy. Mixed floppy/hard disk operation supported.
- Compatible with your existing TRSDOS programs! All BASIC statements are identical.
- A single file may be as large as one disk. Alternate mode allows 24-million byte record range. Directory expandable to handle thousands of files.
- Includes special utilities — backup and copies, HPURGE for multiple deletions, HDOS directory catalog system, and Hard Disk Superzap. FORMAT utility includes options for specifying sectors/gran, platters/disk, logical disk size, etc.

HARD DISK DRIVE & CONTROLLER \$5995 **RACET HSD Software \$400**
Call for multiuser pricing. Dealers call for OEM pricing.

INFINITE BASIC (Mod I & III Tape or Disk) Mod I \$50.00, Mod III \$60.00
Extends Level II BASIC with complete MATRIX functions and 50 more string functions. Includes RACET machine language sorts! Sort 1000 elements in 9 seconds!! Select only functions you want to optimize memory usage.

INFINITE BUSINESS (Requires Infinite BASIC) Mod I & III \$30.00
Complete printer pagination controls — auto headers, footers, page numbers. Packed decimal arithmetic — 127 digit accuracy +, -, *, /. Binary search of sorted and unsorted arrays. Hash codes.

BASIC CROSS REFERENCE UTILITY (Mod II 64K) \$50.00
SEEK and FIND functions for Variables, Line Numbers, Strings, Keywords. 'All' options available for line numbers and variables. Load from BASIC — Call with 'CTRL' R. Output to screen or printer!

DSM Mod I \$75.00, Mod II \$150.00, Mod III \$90.00
Disk Sort/Merge for RANDOM files. All machine language stand-alone package for sorting speed. Establish sort specification in simple BASIC command File. Execute from DOS. Only operator action to sort is to change diskettes when requested! Handles multiple diskette files! Super fast sort times — improved disk I/O times make this the fastest Disk Sort/Merge available on your TRS.
(Mod I Min 32K 2-drive system. Mod II 64K 1-drive. Mod III 32K 1-drive)

★ ★ NEW ★ ★ DISCAT (32K 1-drive Min)

This comprehensive Diskette Cataloging/Indexing utility allows the user to keep track of thousands of programs in a categorized library. Machine language program works with all TRSDOS and NEWDOS versions. Files include program names and extensions, program length, diskette numbers, front and back, and diskette free space.

★ ★ NEW ★ ★

KFS-80 (1-drive 32K Min — Mod II 64K)

Mod I, III \$100.00; Mod II \$175.00

The keyed file system provides keyed and sequential access to multiple files. Provides the programmer with a powerful disk handling facility for development of data base applications. Binary tree index system provides rapid access to file records.

★ ★ NEW ★ ★

MAILLIST (1-drive 32K Min — Mod II 64K)

Mod I, III \$75.00; Mod II \$150.00

This ISAM-based maillist minimizes disk access times. Four keys — no separate sorting. Supports 9-digit zip code and 3-digit state code. Up to 30 attributes. Mask and query selection. Record access times under 4 seconds!!

★ ★ NEW ★ ★ LPSPPOOL (32K 1-drive Min)

Mod I \$75.00

LPSPPOOL — Add multi-tasking to permit concurrent printing while running your application program. The spooler and despooler obtain print jobs from queues maintained by the system as print files are generated. LPSPPOOL supports both parallel and serial printers.

UTILITY PACKAGE (Mod II 64K)

\$150.00

Important enhancements to the Mod II. The file recovery capabilities alone will pay for the package in even one application! Fully documented in 124 page manual! XHIT, XGAT, XCOPY and SUPERZAP are used to reconstruct or recover data from bad diskettes! XCOPY provides multi-file copies, 'Wild-card' mask select, absolute sector mode and other features. SUPERZAP allows examine/change any sector on diskette include track-0, and absolute disk backup/copy with I/O recovery. DCS builds consolidated directories from multiple diskettes into a single display or listing sorted by disk name or file name plus more. Change Disk ID with DISKID. XCREATE preallocates files and sets 'LOF' to end to speed disk accesses. DEBUGII adds single step, trace, subroutine calling, program looping, dynamic disassembly and more!!

DEVELOPMENT PACKAGE (Mod II 64K)

\$125.00

Includes RACET machine language SUPERZAP, Apparatus Disassembler, and Model II interface to the Microsoft 'Editor Assembler Plus' software package including uploading services and patches for Disk I/O.

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INPUT/OUTPUT

Low Cost Printers

A new family of compact, high speed thermal plotter/printers—led by a low priced 80-column unit—is available from Alphacom Inc. The machines combine low cost with features previously associated with expensive high end units and are designed for both the consumer and office-of-the-future markets.

Ranging in price from \$175 to \$595, the new Alphacom Sprinter Series currently includes: Sprinter 80 (\$595 each), a 16- by 9.5- by 5-inch 80-character printer, Sprinter 40 (\$350 each), a 10.5-by 7.5- by 4-inch 40-character printer; and the Sprinter 20 (\$175 each), a 7.5- by 5- by 3-inch 20-character printer.

According to Alphacom, all three low-cost printers are micro-processor-based and can be connected to TRS-80, Apple II, Atari 800, Commodore Pet, Mattel Intellivision and all other personal computers using standard interfaces.

All Sprinter models have a number of advanced features, including: user selectable (via a simple switch) parallel or RS232 serial interface; eight user selectable baud rates; user selectable character or graphics

mode; and software controllable print speeds ranging from two to four lines per second.

The Sprinter 40 and Sprinter 80 are 5-by-8 dot matrix thermal printers which features variable print speeds, using a 280 x n graphic mode up to 240 full 40-character lines are possible per minute with the Sprinter 40; using 560 x n matrix, up to 240 full 80-character lines per minute are possible with the Sprinter 80. For both, 280 dot-wide CRT hard copy printouts are possible in less than 15 seconds.

Each model has a Centronics-compatible parallel and an RS232 serial interface as well as a complete 96-character ASCII character set. Both feature roll and fan fold paper feed.

The Sprinter 20 can print in three character modes: normal, in which characters are formed in a 5-by-8 dot matrix with two dots between character lines—twenty characters can be printed across the page; upside down, identical to the normal mode, except that the characters print 180 degrees rotated with respect to normal printing; and sideways, which allows the Sprinter 20 to be used to print lines with an unlimited number of characters in width. Information that is normally printed on 80 character, 120 character or full sized 132

column printer can be printed sideways.

The 5-by-8 dot matrix printer also features variable print speeds up to 110 full 20-character lines a minute using a graphic 140 x n dot matrix, allowing 140-dot-wide hard copies in less than half a minute.

For more information contact Alphacom, 3031 Tisch Way, San Jose, CA 95128; (408) 249-2152.

Circle No. 107.

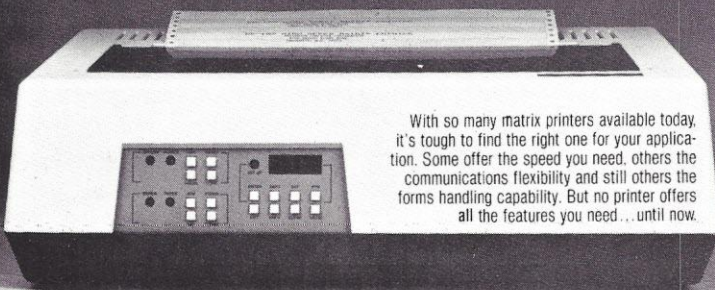
80-Column Printer

A low-priced, 80-column, dot matrix impact printer has been introduced by Epson America, Inc. Considered a breakthrough in printer cost/performance, the company said, the new Epson MX-70, the latest addition to Epson's MX Series of printer, retails for less than \$450.

Despite its low price, the MX-70 shares many features in common with the popular MX-80 introduced last summer. For example, the MX-70 features Epson's Micro-Nine disposable printhead, which, after it's reached a life expectancy rated at between 50 and 100 million characters can be snapped out and thrown away. A new printhead retails for less than \$30 and requires less than a minute to change.

The MX-70 prints unidirectionally

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With so many matrix printers available today, it's tough to find the right one for your application. Some offer the speed you need, others the communications flexibility and still others the forms handling capability. But no printer offers all the features you need...until now.

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The DS 180 provides a total package of performance features for any application where quality impact printing is required. Not a "hobby-grade" printer, the DS 180 is a real work-horse designed to handle your most demanding printer requirements.

High Speed Printing—Bidirectional printing at 180 cps offers throughput of over 200 lpm on average text. A 9-wire printhead generates a 9x7 font with true lower case descenders and underlining.

Non-volatile Format Retention—A unique keypad featuring a non-volatile memory makes programming the DS 180 quick and easy. Top of form, tabs, perforation skipover, communications parameters and many other features may be entered and stored from the keypad. The DS 180 even remembers the line where you stopped printing—eliminating the need to reset the top of form at power-on.

Communications Versatility—Interfaces include RS232, current loop and 8-bit parallel. Baud rates from 110-9600 may be selected. A 1K buffer and X-on, X-off handshaking ensure optimum throughput.

Forms Handling Flexibility—Forms ranging from 3"-15" may be fed from the front or bottom, and an adjustable printhead provides crisp and clear copy on forms with as many as 6-parts.

For more information on how the DS 180's low-cost total printer package can fill your application, contact us at Datasouth. The DS 180 is available for 30-day delivery from our sales/service distributors throughout the U.S.

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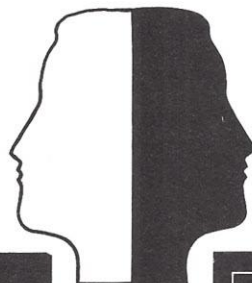
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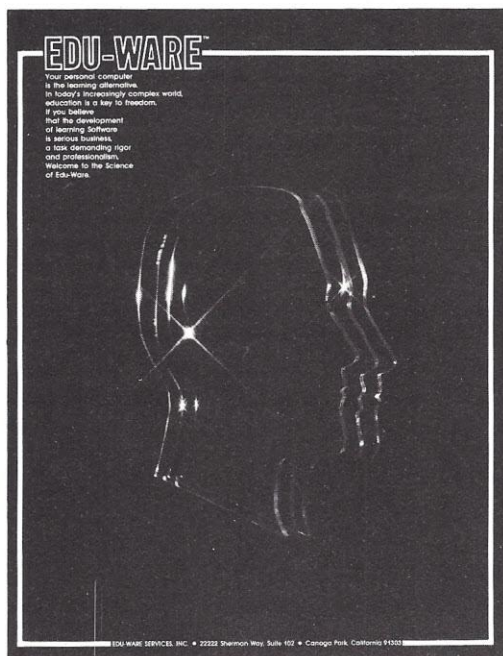
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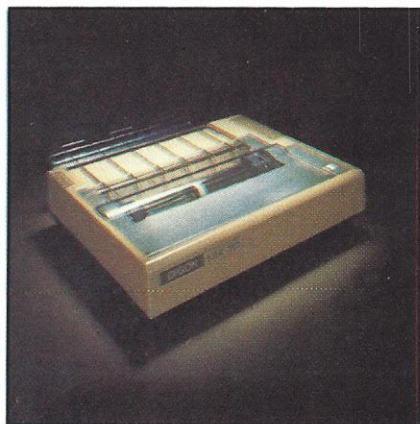
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HARDWARE UPDATE

at 80 characters per second with a user-defined choice of 40- (double-width characters) or 80-column printing. It provides top-of-form



recognition, programmable line feed and form lengths, a self-test mode, and an adjustable tractor feed. Because it is a true dot matrix printer, the machine allows plain paper printing in a crisp, easy-to-read 5 x 7 matrix.

The MX-70 also features GRAFTRAX II, a high resolution (60 dots per inch) function, at no extra charge. The dot placement accuracy of GRAFTRAX II means that the bit image graphics are free of jitter, wander and walk, resulting in better definition, blacker blacks and cleaner grays.

For more information contact Epson America, Inc., 23844 Hawthorne Blvd., Torrance, CA 90505; (213) 378-2220. *Circle No. 108.*

Daisywheel Terminal

A letter quality printing daisywheel terminal has been introduced by Qume Corporation. Named the SPRINT 9, this terminal is designed to bring letter-quality and Receive-Only data terminal versatility to computer users. Considered one of the most significant developments in daisywheel printing since the introduction of the first Qume daisywheel

printers, the SPRINT 9 features an innovative "Direct Drive" mechanism which promises greater print accuracy and system reliability coupled with a complete Receive-Only data terminal, the company said.

The steel cable and pulley drive used in other daisywheel terminals has been replaced in the SPRINT 9 by the MicroDrive carriage mechanism which uses a custom designed belt of DuPont KEVLAR® to position the printer for each strike. Without the cable and multiple pulley system used in other terminals, there is less tension on the printer chassis and greater tolerance for service adjustment, resulting in a longer life for the system, the company said. The SPRINT 9 series offers a demonstrated mean time between failure (MTBF) significantly better than other daisywheel terminals.

While sharing many features with

continued on page 93

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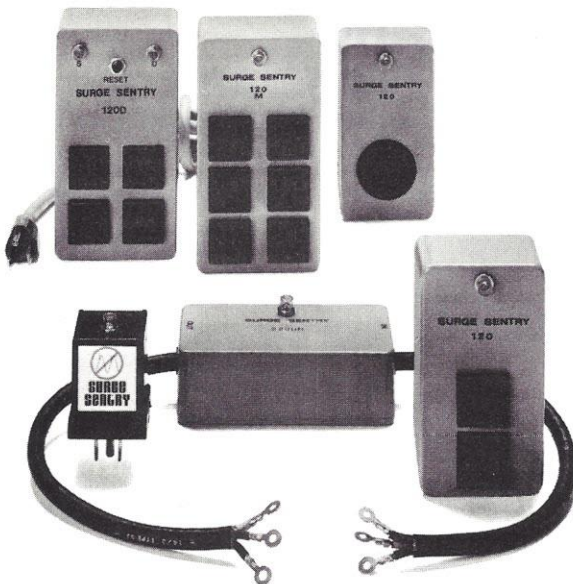
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CIRCLE 46

NEWS

make their own code for this type of device." He also said that over the next three to five years much better synthesis will be introduced.

Barry Schiffman of Heuristics believes that the future will bring products that are speaker independent. He also thinks that software will be developed to make use

of voice and allow a non-programming computer user to use the product in a more beneficial way.

Milo Street of Street Electronics thinks that "the phoneme is going to get better and on the other hand encoding entire words is going to be easier to do." He also believes there will be better quality for less money.

One Megabaud Network from Corvus

Corvus Systems, a leading supplier of Winchester disk systems for the microcomputer field, has introduced a network called OMNINET for personal computers. The firm says that OMNINET offers microcomputers users the power and versatility of main-frame network systems costing thousands of dollars.

OMNINET is a one megabaud network utilizing low-cost, shielded twisted pair cable in lieu of more costly and bulky coaxial cable. The network allows the interconnection of up to 64 microcomputers and peripherals in a 4,000-foot serial link.

The intelligence of the system is centered around the OMNINET transporter which is an interface consisting of a Motorola 6801 microprocessor, custom circuitry and associated support components. The transporter interfaces directly to a microcomputer or peripheral on any network node and provides the transfer of error-free,

variable-length messages with no software intervention, company representatives said.

"Thus, total network management is provided to the OMNINET user without the need of a costly Network Control Processor," the firm states. "The twisted pair data link also offers low cost and ease of installation and does not require the expensive isolation circuits required by other networks.

"OMNINET is the first high-performance network to provide the cost efficiencies required by the microcomputer market," a representative added.

The initial product release of OMNINET in May includes provisions for the Apple II, Onyx C8000 and Digital Equipment Corporation's LSI-11. The product will also connect to any existing Corvus peripheral including the 5-, 10- and 20-million byte Winchester. Future transporters will include the Apple ///, Radio Shack TRS-80, and S-100 Bus

computer, Atari, Commodore, and Altos.

OMNINET transporters are priced at \$495 for the Apple and S-100 Bus computers; \$750 for the DEC LSI-11; and \$650 for the Onyx C8000. The disk server for Corvus Winchester disks will retail for \$990.

According to the company, OMNINET works with both of the firm's previous product releases known as MIRROR—a video system for Winchester backup—and CONSTELLATION—a local back-end network.

The Corvus MIRROR is an archival backup system for Winchester disk drives. Using the intelligence inherent in the Corvus controller, the MIRROR translates a personal computer's digital data into video signals resulting in fast and reliable storage. The data are stored or retrieved at the rate of one million bytes per minute and a standard home video cassette can store 120 million bytes of data. The MIRROR employs standard video technology and is fully compatible with home or industrial video recorders, CATV for long-distance transmission, and even video disks.

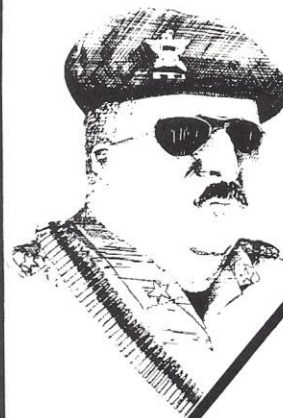
OMNINET also works with Corvus CONSTELLATION which now has a base of over 1,000 systems.

The CONSTELLATION is a back-end network that allows the interconnection of up to 64 microcomputers in a "star" configuration with a Corvus disk system as its hub. The

CONSTELLATION provides up to 80 million bytes of shared mass storage with multi-level file and user security, "pipes" (buffered FIFO [First In First Out] communications, operating system independent electronic mail) and spooled peripherals. The system was designed to support all of the Corvus compatible equipment and does so by means of its intelligent disk controller. Although the network is oriented towards the Pascal user, it provides varying levels of support to native operating systems, Digital Research's CP/M and OASIS. The CONSTELLATION uses standard 34-pin flat cable and allows node connections of up to 50 feet from the centralized multiplexers, devices that make it possible to transmit two or more messages simultaneously over a single channel or other transmission facility.

Corvus' initial product was the first 8-inch Winchester disk system available to the microcomputer marketplace. The system interfaced to a broad range of computers spanning the spectrum from the Apple and TRS-80 Model I system to the DEC LSI-11.

"The market demanded more than just mass storage, it required cost-effective backup and sharing of data," a representative said. "The company responded to those demands with the Corvus MIRROR in November, 1979, and the CONSTELLATION in March, 1980."



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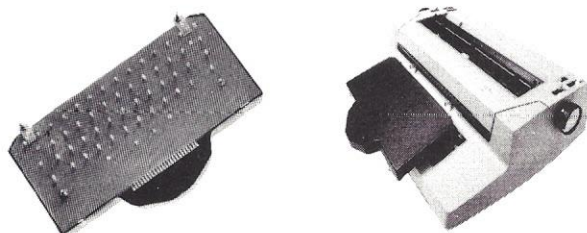
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CIRCLE 49

NEWS

National Computer Camp Will Teach New Directors

This year's National Computer Camp will be attended in Moodus, Connecticut by the usual group of young computer buffs as well as a number of future camp directors. Dr. Michael Zabinski, executive director of National Computer Camp, is offering this unique camp concept to those who desire to head up a camp modeled after Zabinski's successful summer overnight camp. The camp, now in its fourth year, is the brainchild of Dr. Zabinski. "It is a recreational and educational experi-

rectly working with computers, they enjoy lectures, films and discussions on computers and their impact. Emphasis is placed on a "hands-on" experience along with a well structured learning program.

Why such a camp? Computers have affected the lives of all of us. Computer applications have penetrated, directly or indirectly, nearly every aspect of human affairs, according to Zabinski. "Youngsters need to be prepared to live in a computerized society. Both parents and students are



When campers are not working directly with computers they enjoy lectures, films, and discussions about them.

ence for youngsters ages 10 to 18 years old," commented Zabinski.

Far from the typical camp experience, when the youths are not di-

aware of the computer revolution and are interested in computer literacy," he said.

During the last three summers, the camp has

been fully subscribed and has attracted students from throughout the U.S. With an ever increasing demand by youths and in response to numerous requests for advice in forming similar enterprises, Dr. Zabinski will, for the first time, share his expertise with entrepreneurs who will attend the camp for a one week session in July. At camp, they will observe the operations and learn the curriculum of the camp.

Dr. Zabinski will be joined in his counseling effort by Attorney Melvin Ditman. Together

they have formed Computer Camp Investment Services which will aid future camp directors in the financial and business aspects of conducting a computer camp, and give direction in attracting students and locating camp facilities. Computer experience is not required to operate the camp.

For further information write to Computer Camp Investment Services, P.O. Box 1406, New Haven, CT 06510, or call Mr. Ditman at (203) 789-0070 or Dr. Zabinski at (203) 255-5411.

Agriculture's First Electronic Marketing Information Service

Merril J. Oster, president of Professional Farmers of America, has announced plans for agriculture's first electronic marketing information service, Instant Update, which provides farmers and agribusinessmen immediate access to the market-making events that affect commodity prices.

A staff of editors stationed at the Professional Farmers' headquarters in Cedar Falls, IA, and Washington, DC, analyze and interpret news and prices from an agricultural viewpoint. Their reports are programmed into a master computer data bank for exclusive access by Instant Update subscribers.

Instant Update infor-

mation will be transmitted via telephone lines to an in-home or in-office receiver designed by Tandy Corporation. This simple hardware system uses a standard telephone and television set to receive and display the information 24 hours per day. Cost for the service is \$95 per month, plus the toll charges for a two to five minute station-to-station telephone call for each update.

"Instant Update is a breakthrough in agricultural marketing information," Oster said, "because it provides agribusinessmen with both timely facts and analysis." Instant Update also allows farmers even in the most remote areas of the country, up-to-the-minute information

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	T1745 Portable Terminal	1,595	153	85	58
	T1765 Bubble Memory Terminal	2,595	249	138	93
	T1783 Portable KSR, 120 CPS	1,745	167	93	63
DATAMEDIA	T1785 Portable KSR, 120 CPS	2,395	230	128	86
	T1787 Portable KSR, 120 CPS	2,845	273	152	102
	T1810 RO Printer	1,895	182	102	69
	T1820 KSR Printer	2,195	211	117	80
	DT80/1 CRT Terminal	1,695	162	90	61
LEAR SIEGLER	DT80/5 APL CRT	2,095	200	112	75
	DT80/5L APL 15" CRT	2,295	220	122	83
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	ADM31CRT Terminal	1,450	139	78	53
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CIRCLE 51

June 1981/Personal Computing

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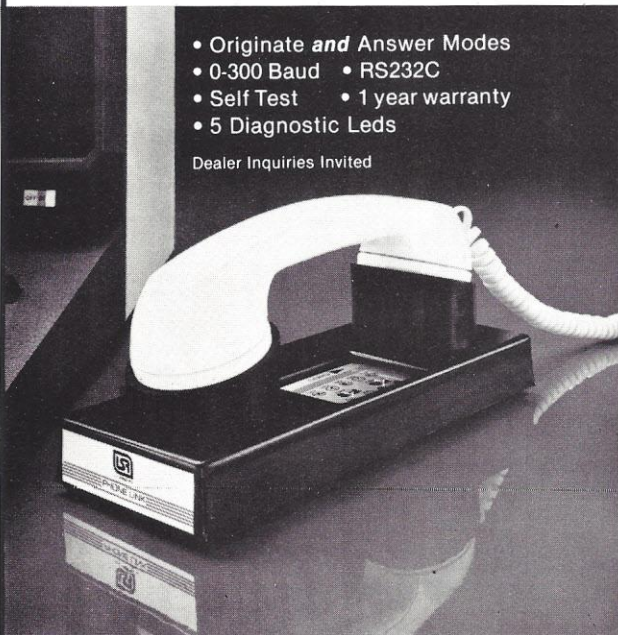
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CIRCLE 53

NEWS


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Future prices for corn, oats, soybean meal, Chicago wheat, Kansas City wheat, Minneapolis wheat, hogs, fed cattle, feeder cattle, sunflowers, cotton and gold are updated every 10 minutes during trading hours. All important options will be provided and closing prices will be on the system after trading hours.

In addition to future prices, Instant Update also provides a Cash Market Scan which tracks the difference between cash and futures, called basis, at several key points for the major crops. Technical Triggers, a summary of important chart points including support and resistance, plus analysis highlighting other key chart signals important to marketing decisions, is also included in instant Update. Another feature is Price Chart Trends, a weekly report from Com-

modity Price Charts analyzing all major commodities including interest rates and precious metals.

Washington Watch, news from Professional Farmers' Washington Bureau, alerts subscribers to major market-making events from Washington, plus details of important government reports. Market Strategy, a commodity-by-commodity summary of the Professional Farmer's overall marketing plan and Market Tactics, a summary of current recommendations, are also included. The user can also call up their own state's weather including updates on weekends.

"The steady flow of news and analysis Instant Update gives the agribusinessman is more than a 'feel' for the market," added Oster. "It can develop a higher level of confidence in making decisions." 



"A software problem? Our company has been taken over by a 9 year-old girl playing Star Trek on a microcomputer—and you call it a software problem?"

continued from page 85

earlier Qume models, the SPRINT 9 has many new features and advantages in addition to MicroDrive including: 30% fewer parts, circuit boards reduced from four to three, power supply moved inside cover, simplified service access, meaning less expensive servicing; improved ribbon handling with new "Clean Hands" Quickload cartridge system—Multistrike IV ribbon cartridge permits 375,000 characters; acoustic noise level reduced to 65 dBA, maximum; greater EDS immunity; less vulnerability to static electricity; automatic proportional spacing, switch selectable; "Hot Zone" automatic carriage return; and new contemporary exterior styling, the company said.

The SPRINT 9 terminal uses the industry standard RS232C interface to plug directly into most minicomputers and provides all current word processing functions. Print speeds are available in both 45 CPS and 55 CPS. The SPRINT 9 series offers a superset of the SPRINT 5 command set with enhancements available, such as automatic "Logic Seeking" bi-directional printing.

The SPRINT 9 series, designed to supplement the SPRINT 5, is compatible with the full line of Qume supplies, including more than 94 plastic printwheels, ribbon cartridges and other accessories, the company said.

The single unit price for the SPRINT 9 is \$1,950. For more information contact Qume Corp., 2350 Qume Dr., San Jose, CA 95131; (408) 942-4000. *Circle No. 109.*

SYSTEMS

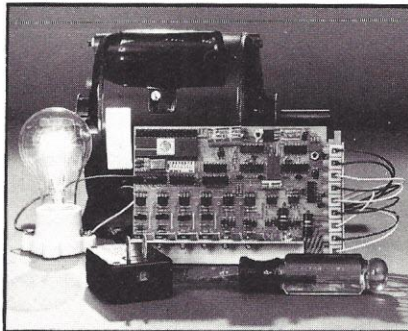
Single Board Computer

A new single board computer with analog, serial, and power control I/O has been announced by WINTEK. The 4½" x 6½" module features a 6801 or 68701 microprocessor with 2K bytes ROM, 128 bytes RAM, an internal timer, and an external watchdog timer.

The 12-bit analog-to-digital con-

verter can be configured for eight single ended or four differential inputs. The 8-bit digital-to-analog converter can be configured to output either 4–20 ma or 1–5 volts.

The eight digital I/O lines can be configured for any mix of AC or DC inputs or outputs. Inputs sense the activity of AC or DC circuits. AC and DC outputs are triacs and solid state relays capable of switching 3 amps.

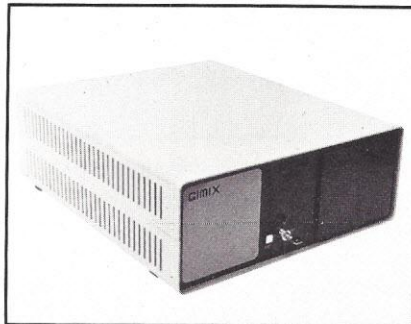


The serial I/O allows a half duplex 20 ma current loop communication channel to a host computer at software selectable baud rates.

The price ranges from \$88 to \$295 depending on options and quantity. Applications include remote data acquisition, machinery control and energy management. For more information contact WINTEK Corporation, 1801 South St., Lafayette, IN 47904; (317) 742-8428. *Circle No. 110.*

32KB System

GIMIX' new 32KB systems feature the GIMIX mainframe with 30 amp. ferro-resonant power supply; fifteen 50-pin and eight 30-pin



slot mother board; 2MHz CPU with time of day clock and battery back-

up, 6840 programmable timer, provisions for 9511A or 9512 Arithmetic processors, 1K RAM, and 4 PROM/ROM/RAM sockets that can hold up to 32KB of monitor and user software; 32KB of Static RAM; and two RS232 serial I/O ports. The systems can be expanded by adding memory, serial and parallel I/O, video displays, etc.

The 32KB systems are priced at \$2194.89. For more information contact GIMIX, INC. 1337 West 37th Place, Chicago, IL 60609; (312) 927-5510. *Circle No. 111.*

COMMUNICATION

Smart Modem

Hayes Microcomputer Products, Inc., announces the Hayes Stack Smartmodem high performance data communications system for small computers. The Smartmodem, an FCC-approved direct-connect device, is designed for use with RS-232C compatible computers or terminals to communicate via the telephone system with other computers or time sharing systems.

A unique feature is that the Smartmodem can be program controlled in any language by ASCII character strings, the company said. This intelligent datacomm system analyzes and executes commands and in response sends result codes which, at the user's discretion, can be English words or decimal digits. The Smartmodem has auto dial and auto answer capabilities. A special design feature is that all circuitry required for auto dial and auto answer is installed within the Smartmodem. This eliminates the need for any auxiliary equipment and makes the Smartmodem a stand-alone system, the company said.

The Hayes Stack Smartmodem can be connected to any telephone system in the U.S. since dialing can be either Touch-Tone or pulse. Furthermore, both dialing modes can be combined within a command with pulse being used.

An audio monitor permits you to follow the progress of the call and be alerted to wrong numbers and busy signals. If a busy signal is encountered, by entering a repeat command, the Smartmodem will automatically redial the number at any time.

Operation can be in full or half duplex with a data rate of 0-300 baud. Power-on default options are controlled by the positioning of seven options switches. Four of these options can be overridden by software command. LED status indicators on the front panel of the unit provide a visual check of the Smartmodem's operational status.

In addition, the "Set" commands allow you to select (and change) various operational parameters such as dialing speed, escape code character and number of rings to answer on.

The Smartmodem has a two year limited warranty. The suggested retail price for the Hayes Stack Smartmodem system is \$279. Included in this price are the Smartmodem unit, a power pack, one modular telephone cable to connect the unit to the telephone line and an owner's manual. For more information contact Hayes Microcomputer Products, Inc., 5835 Peachtree Corners East, Norcross, GA 30092; (404) 449-8791. *Circle No. 112.*

Small Business Modem

A new, compact, under-the-phone 300 bps modem from General DataComm, priced under \$200 is aimed at the small business/home computer user. The 103J-L has features not found in modems in this size and price range, the company said. It operates over all dial telephone lines, even those not usable by line powered units. A Data/Talk Switch selects data or talk modes. An indicator for DataFlow and Carrier Detect shows transmit and receive data activity, and indicates that a call is established with another modem.

Answer and originate mode is automatically selected, making it un-

necessary to select operating mode. An indicator shows in which mode the modem is operating. The 103J-L features self diagnostics which loops data from the terminal through the modem to check operation.

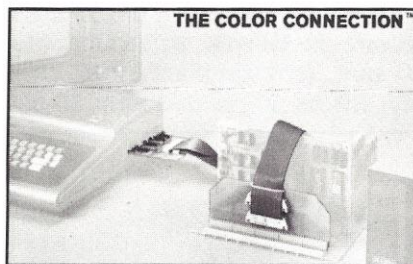
For installation, the modular plug from the phone connects to a jack in the 103J-L's rear panel. A standard six pin connector from the modem accesses the telephone line. Business equipment connects to the 103J-L with an EIA 25 pin RS-232C connector.

The 103J-L is priced at \$199. For more information contact General DataComm Industries, Inc., One Kennedy Ave., Danbury, CT 06810; (203) 797-0711. *Circle No. 113.*

INTERFACES

Color Expansion

Percom Data Company introduced the Color Connection, a device which permits extension of the TRS-80 Color Computer system bus as a System-50 bus (SS-50 bus). The Color Connection allow you to expand a TRS-80 Color Computer—using proven System-50 modules—into a serious computer, the company said. TRS-80 Color Computers and System-50 bus computers are built around the 6809 microprocessor. The SS-50 bus compatible modules of other manufacturers may also be used in system expansion.



The Color Connection consists of a flat ribbon extension cable with interfacing PC cards at each end. One end plugs into the Program Pak socket of the Color Computer and the other end plugs into a System-50 motherboard. Function modules plug into the motherboard, which is

not included. The Color Connection sells for \$99.95 complete with application instructions. For more information contact Percom Data Co., 211 N. Kirby, Garland, TX 75042; (214) 272-3421.

Circle No. 114.

S-100 Bubble-Memory

The Bubble-Tec Division of PC/M, Inc., has announced immediate availability of the industry's first S-100 bus compatible magnetic-bubble memory system, the company said.

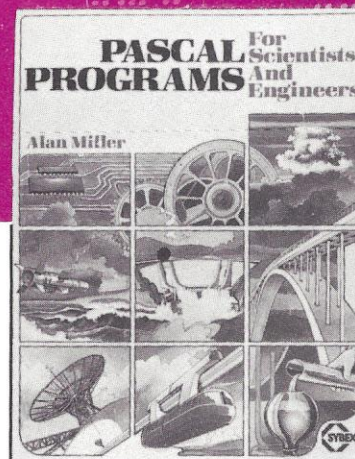
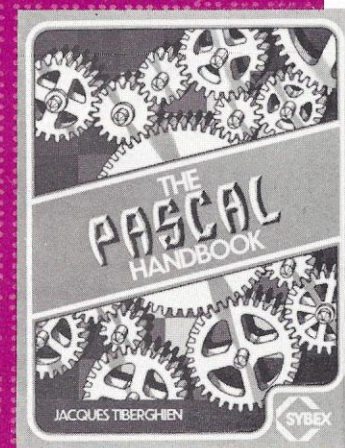
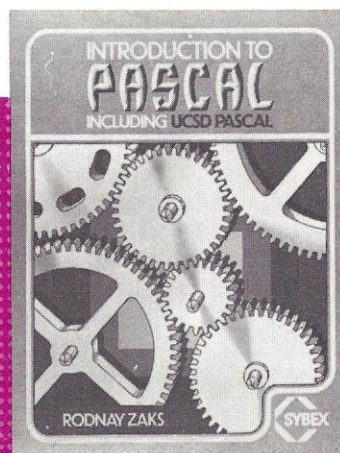
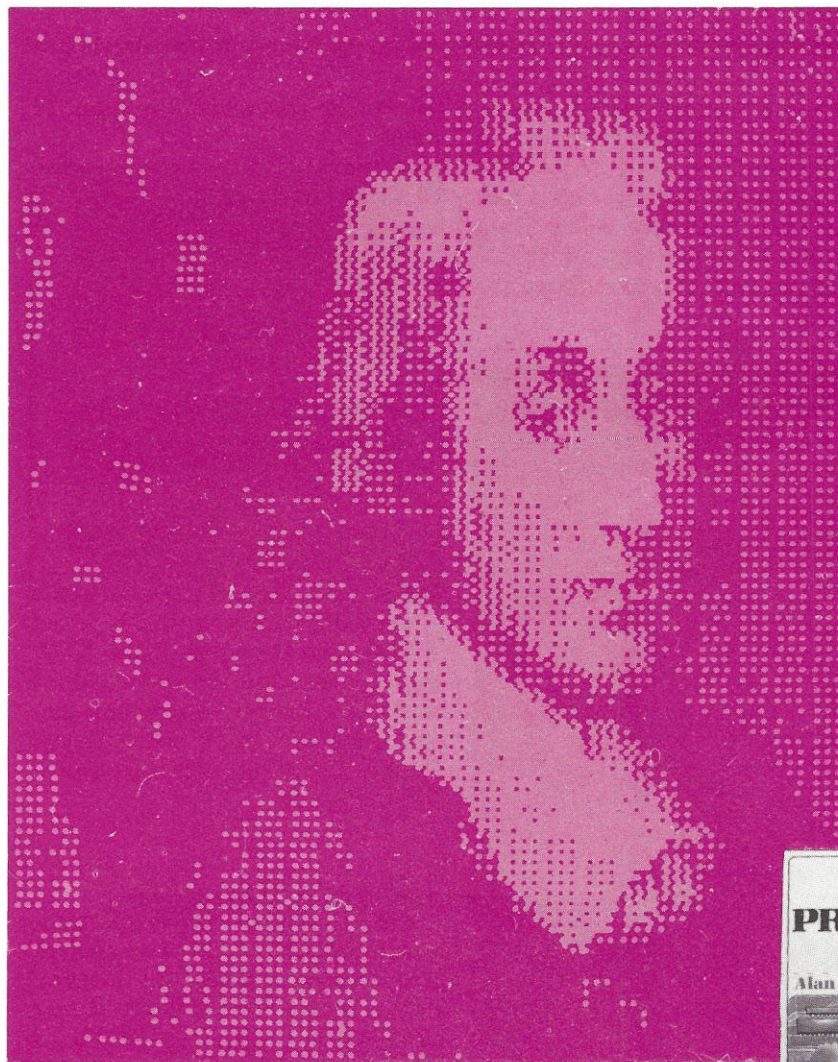
Bubble-memory systems provide the ideal mass-storage medium for applications where rotating floppy- or hard-disk drives are unsatisfactory. They can be successfully used in dirty or dusty environments that would preclude use of moving mechanical parts. Other advantages of bubble-memory are small size, silent operation, long life compared to electro-mechanical systems, low power consumption and very fast operation.

The new S-100 compatible bubble-memory system comprises a single printed-circuit controller module (designated the MBC-100 Bubbl-Board) and one or more bubble-memory modules (designated the MBB-100 Bubbl-Pac). All modules have standard S-100 dimensions, and can plug directly into any S-100 system. The MBB-100 modules can, if desired, be housed in an external chassis.

The MBC-100 Bubbl-Board controller contains its own 8-bit microprocessor and is capable of controlling up to 16 MBB-100 Bubbl-Pacs. The micro-processor handles bubble-devices formatting, error-checking and control, as well as interfacing the complete bubble-memory system to the S-100 bus. The controller is also fully compatible with the CP/M operating system and a CP/M-type software driver is provided with the MBC-100.

Each MBB-100 Bubbl-Pac contains 46K bytes of bubble-memory mass storage. After formatting this

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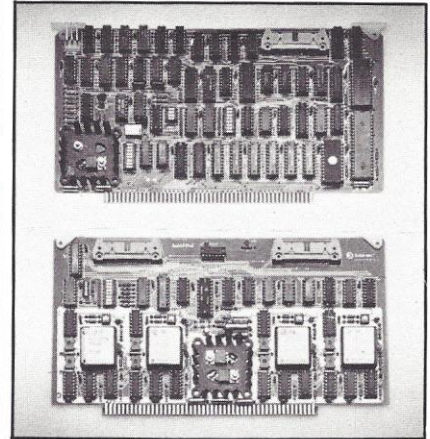
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is equivalent to about 320 floppy-disk sectors. With six MBB-100 Bubbl-Pac modules in the system, bubble-memory storage is equivalent to the capacity of a single-density floppy disk.

Operation of the MBC/MBB-100

system is extremely fast, the company said. Access time is less than 4 milliseconds average, 7.27 milliseconds maximum (nearly 1000 times faster than a floppy disk). Data transfer rate is in excess of 88,000 bits per second. Power required for

the entire system is less than 25 watts.



The MBC-100 controller is priced at \$361, and the MBB-100 at \$772. Delivery is normally two to three weeks. For further information contact Bubbl-Tec, 6800 Sierra Court, Dublin, CA 94566; (415) 829-8700. *Circle No. 115.*

PERSONAL COMMUNICATIONS



\$299

VersaModem™... BIZCOMP's Auto-Dial, Auto-Answer Intelligent Modem for Personal Computers

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It's no secret that the latest microcomputer applications need automatic dialing and automatic answer. The secret is in VERSATILITY and EASE OF USE. Other auto-dialing modems commit you to a particular computer bus. Not so with the VersaModem. It gives you full dialing control using an RS232 interface. One Intelligent Modem serves computers made by Apple, Radio Shack, Commodore, Atari and many others. That's right—RS232 compatibility protects your modem investment. Ease of use is assured with BIZCOMP's unique Code-Multiplexed Design. And the message command set is designed to simplify your applications software.

Before you buy a computer modem, look at BIZCOMP's versatility. Look at BIZCOMP's quality. With BIZCOMP's VersaModem you won't need another modem. If your local computer store doesn't already have a VersaModem on display, ask them when they will!

BIZCOMP Communications...
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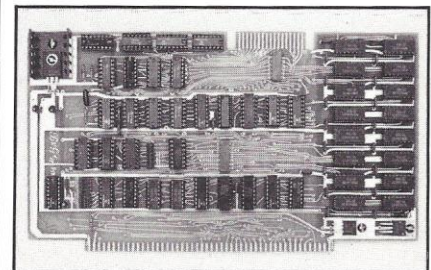
P.O. Box 7498 • Menlo Park, CA 94025 • 415/966-1545

Patent Pending

CIRCLE 55

32K Dynamic RAM

B&G Computer Applications announces the introduction of its dual-port Dynamic RAM for General Purpose and Direct Memory Access applications. The Top-Of-Board DMA port allows memory access without disabling or interrupting the CPU, yielding higher effective operating speed the company said. The DMA port can be software enabled or disabled and I/O bank selected. This allows the port to be dedicated to video I/O or disk systems while the CPU continues functioning with other memory. The versatility of the DMA Port makes it ideal for applications in high resolution graphics.



The 32K memory features two in-
continued on page 99

EAST COAST

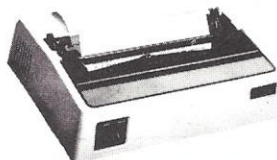
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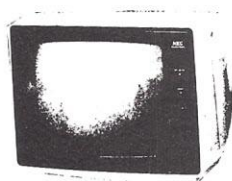
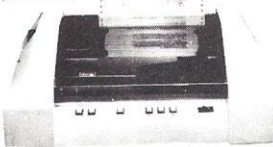


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NEC 5510 SPINWRITER	\$2395
OKIDATA MICROLINE-83	\$949
APPLE II PLUS 48K	\$1179
APPLE DISK w/ 3.3 DOS Controller	\$545
APPLE DISK w/o Controller	\$435
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HAZELTINE 1420	\$799
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ATARI 400 16K	\$499
RADIO SHACK 16K Level II Model 3	\$875
RADIO SHACK 64K Model 2	\$3449
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- DOS PLUS FOR MOD III** . . . \$ 99.95
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continued from page 96

dependent 16K banks addressable on 16K boundaries. Software control versatility allows 16K, 32K, 48K, or 64K bank selection. Other features include: transparent refresh, S-100 and IEEE S-100 compatibility and low power consumption (7 watts maximum).

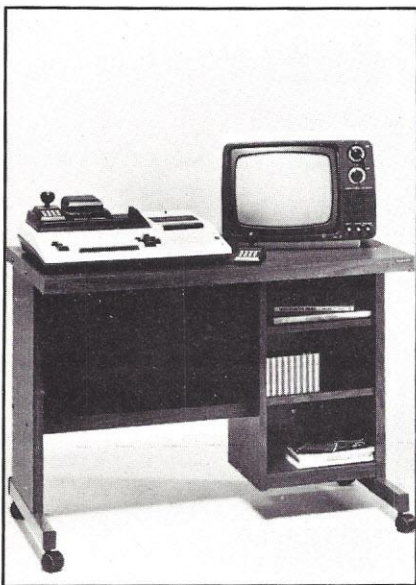
B&G Computer Applications' new Dual-Port RAM allows computer speeds otherwise unattainable in applications involving video I/O, disk through DMA port and multi-user time sharing systems the company said. The Dual-Port DMA RAM also can be used as a standard 32K RAM.

The B&G Dual Port RAM is compatible with 8080, 8085, and 4MHz Z80 CPUs without wait states. Assembled and tested, prepaid (U.S.), \$579. For information contact B&G Computer Applications, 206 Brookside, Bryan, TX 77801. *Circle No. 116.*

BITS & PIECES

Custom Table

Compu-Table, custom designed electronics furniture expressly for home computers, provides space to accommodate any computer keyboard and monitor in convenient operating and viewing positions.



Below left is a storage shelf with plenty of leg room for comfortable seating when using the system. On the right side is a 22 1/4" tall storage area with two shelves. The Compu-Table is finished in a rich walnut tone with Rendura coating to protect against scratches and stains. The unit features hooded, dual-wheel casters for convenient mobility. Glides are provided for stationary use. Approximate retail, \$130.

For more information contact GUSDORF Corp., 6900 Manchester Ave., St. Louis, MO 63143. *Circle No. 117.*

New Stock Form

Discount Data Forms, Inc., has added a new NCR black print invoice to their line of continuous stock forms. The format for this invoice conforms to many existing software packages and for a limited time the firm is offering 100 free credit memos with an order placed for this form.

The new invoice is available for immediate shipment. Prices range from \$79 per thousand to \$37.70 per thousand. Samples and pricing information is available on request for many of the company's stock items.

For more information contact Discount Data Forms, Inc., 407 Eisenhower Lane South, Lombard, IL 60148; (312) 629-6850. *Circle No. 118.*

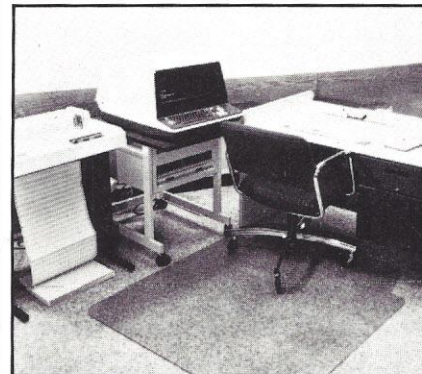
Anti-static Mat

A new transparent, anti-static chair mat has been introduced by United Technical Products, Inc., specialists in anti-static products.

The mat, which will be sold under the Clear-Stat trademark, is made of heavy-gauge vinyl and features non-skid grippers on the underside. Static dissipating material is contained in a grid of ultra-thin lines just beneath the entire surface of a transparent overlay. This overlay is fusion-bonded to a heavier transparent base.

Clear-Stat mats are available currently through major office supply dealers throughout the country.

They are list-priced at \$198 for the 60" x 48" size and \$178 for 53" x 45". Both sizes have a 10" x 33" lip.

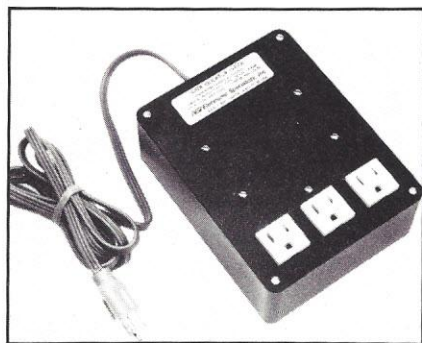


Further information on Clear-Stat chair mats is available from United Technical Products, Inc., 32 Southwest Industrial Park, Westwood, MA 02090; (617) 337-4718. *Circle No. 119.*

Pollution Control

Electronic Specialists' recently announced Super Isolator is designed to control electrical pollution. Incorporating heavy duty spike/surge suppression, the Super Isolator features three individually dual-Pi filtered AC sockets. Equipment interactions are eliminated and disruptive/damaging power line pollution is controlled. The Super Isolator will control pollution for an 1875-watt load. Each socket can handle a 1000-watt load.

Severe AC Power Line pollution can be controlled with the Model ISO-3 Super Isolator for \$94.95. For more information contact Elec-



tronic Specialists, Inc., 171 South Main St., Natick, MA 01760; (617) 655-1532. *Circle No. 120.*

continued on page 104

PROGRAM LISTINGS

Calorie Crunching

continued from page 33

```

10 REM          A DIET PROGRAM
20 REM
30 REM          CREATED BY
40 REM
50 REM          DR. HELEN L FRYE
60 REM          WINNIPEG MANITOBA CANADA
70 REM
80 REM          THIS PROGRAM IS DESIGNED TO CALCULATE IDEAL BODY WEIGHT
90 REM          AND USE THIS WEIGHT (OR A GOAL WEIGHT) AS AN AID IN
100 REM         FINDING AN APPROPRIATE DIET. IT WAS ORIGINALLY DESIGNED
110 REM         FOR USE IN A PHYSICIAN'S OFFICE BUT CAN BE USED BY ANYONE.
120 REM
130 REM
140 REM DIETS
150 P=2
160 DIM N$(30)
170 PRINT CHR$(126);CHR$(28)
180 INPUT "ALIGN PRINTER AND TOUCH RETURN ",E1$
190 !\!\!
200 !#P "*****"
210 PRINT "THE PATIENT'S NAME IS"
220 INPUT N$
230 PRINT
240 PRINT "AGE"
250 INPUT A
260 IF A<22 THEN GOTO 290
270 PRINT "THIS PERSON IS TOO YOUNG FOR THIS PROGRAM. "
280 GOTO 3860
290 PRINT
300 PRINT "DO YOU HAVE HEIGHT IN INCHES OR CM.?(TYPE I OR C)"
310 INPUT B$
320 PRINT
330 PRINT "HEIGHT?"
340 INPUT H
350 IF B$="I" THEN H=H*2.54
360 PRINT
370 PRINT "DO YOU HAVE WEIGHT IN KG. OR LB.?(TYPE K OR L)"
380 INPUT J$
390 PRINT
400 PRINT "WEIGHT"
410 INPUT W
420 IF J$="L" THEN W=W/2.2
430 PRINT
440 ! "SEX OF PATIENT (F OR M)? "\ INPUT S$
450 IF S$="F" THEN S=2\ IF S$="M" THEN S=1
460 PRINT
470 PRINT "PATIENT'S BODY BUILD"
480 PRINT TAB(20);"1=LIGHT BUILD"
490 PRINT TAB(20);"2=MED. "
500 PRINT TAB(20);"3=HEAVY"
510 INPUT B
520 PRINT
530 PRINT "ACTIVITY"
540 PRINT TAB(10);"1=LIGHT"
550 PRINT TAB(10);"2=MODERATE"
560 PRINT TAB(10);"3=HEAVY"
570 INPUT C
580 R=0
590 REM CALCULATE IBW FEMALE
600 L=H-152
610 IF S=1 THEN GOTO 690
620 K=45.5+L*.9
630 IF B=1 THEN K=K*.8
640 IF B=3 THEN K=K*.8
650 PRINT#P "DIET FOR ",N$
660 PRINT TAB(5);"IBW=",K," KG. "
670 PRINT#P TAB(5);"IBW=",K," KG",TAB(35);"PRESENT WEIGHT: ",%F2,W," KG. "
680 GOTO 770
690 REM CALCULATE IBW MALE
700 K=48+L*.1
710 IF B=1 THEN K=K*.8
720 IF B=3 THEN K=K*.8
730 PRINT#P TAB(10);"DIET FOR ",N$
740 PRINT#P
750 PRINT TAB(5);"IBW=",K," KG. "
760 PRINT#P TAB(5);"IBW=",K," KG",TAB(35);"PRESENT WEIGHT: ",%F2,W," KG. "
770 ! "WHAT IS THE PATIENT'S GOAL WEIGHT (ENTER 0 IF NONE)? " \INPUT Q
780 IF Q=0 THEN 830
790 ! "IS THIS GOAL WEIGHT IN LB. OR KG. (L OR K)? " \INPUT " ,B1$
800 IF B1$="L" THEN Q=Q/2.2
810 !#P TAB(35);"GOAL WEIGHT: ",TAB(53);%F2,Q," KG. "
820 GOTO 840
830 Q=K
840 IF S=1 THEN GOTO 1420
850 REM CALCULATING CALORIES FEMALE
860 IF Q<39 THEN GOTO 890
870 PRINT "NUMBER OF CALORIES IS TOO SMALL FOR THIS PROGRAM"
880 GOTO 3860
890 IF A<65 THEN GOTO 1310
900 IF A<45 THEN GOTO 1200
910 IF A<35 THEN GOTO 1090
920 REM DIET FOR 22 YEAR OLDS (FEMALE)
930 IF Q<70 THEN GOTO 1010
940 IF Q<70 THEN R=2300
950 ! "THIS WEIGHT IS TOO LARGE TO ACCURATELY CALCULATE A PROPER DIET"
960 !#P"THIS WEIGHT IS TOO LARGE TO ACCURATELY CALCULATE A PROPER DIET"
970 ! "AN 1800 CAL DIET IS RECOMMENDED TO BEGIN"
980 !#P"AN 1800 CAL DIET IS RECOMMENDED TO BEGIN"
990 ! "DO YOU WISH AN 1800 CAL DIET PRINTED OUT? (Y/N) "\INPUT G1$
1000 IF G1$="Y" THEN GOTO 3390 ELSE 3860
1010 IF Q<70 THEN R=2300
1020 IF Q<65 AND Q<70 THEN R=2200
1030 IF Q<60 AND Q<65 THEN R=2050
1040 IF Q<58 AND Q<60 THEN R=2000
1050 IF Q<50 AND Q<58 THEN R=1800
1060 IF Q<45 AND Q<50 THEN R=1700
1070 IF Q<40 AND Q<45 THEN R=1550
1080 GOTO 2070
1090 REM DIET FOR 35 YR OLDS
1100 IF Q<70 THEN GOTO 960
1110 IF Q<70 THEN R=2200
1120 IF Q<65 AND Q<70 THEN R=2100
1130 IF Q<60 AND Q<65 THEN R=1950
1140 IF Q<58 AND Q<60 THEN R=1900
1150 IF Q<55 AND Q<58 THEN R=1850
1160 IF Q<50 AND Q<55 THEN R=1700
1170 IF Q<45 AND Q<50 THEN R=1600
1180 IF Q<40 AND Q<45 THEN R=1500
1190 GOTO 2070
1200 REM DIET FOR 45 YEAR OLDS
1210 IF Q<70 THEN GOTO 960
1220 IF Q<65 AND Q<70 THEN R=2000
1230 IF Q<70 THEN R=2100
1240 IF Q<60 AND Q<65 THEN R=1900
1250 IF Q<58 AND Q<60 THEN R=1850
1260 IF Q<55 AND Q<58 THEN R=1800
1270 IF Q<50 AND Q<55 THEN R=1650
1280 IF Q<45 AND Q<50 THEN R=1550
1290 IF Q<40 AND Q<45 THEN R=1450
1300 GOTO 2070
1310 REM DIET FOR 65 YEAR OLDS
1320 IF Q<70 THEN GOTO 960
1330 IF Q<70 THEN R=1950
1340 IF Q<65 AND Q<70 THEN R=1850
1350 IF Q<60 AND Q<65 THEN R=1700
1360 IF Q<58 AND Q<60 THEN R=1700
1370 IF Q<55 AND Q<58 THEN R=1650
1380 IF Q<50 AND Q<55 THEN R=1500
1390 IF Q<45 AND Q<50 THEN R=1450
1400 IF Q<40 AND Q<45 THEN R=1300
1410 GOTO 2070
1420 REM CALCULATING CALORIES MALE
1430 IF Q<49 THEN GOTO 1460
1440 PRINT "NO. OF CALORIES NEEDED IS TOO SMALL FOR THIS PROGRAM"
1450 GOTO 3860
1460 IF A<65 THEN GOTO 1780
1470 IF A<45 THEN GOTO 1920
1480 IF A<35 THEN GOTO 1640
1490 REM DIET FOR 22 YEAR OLDS
1500 IF Q<100 THEN GOTO 1520
1510 GOTO 960
1520 IF Q=100 THEN R=3700
1530 IF Q<95 AND Q<100 THEN R=3500
1540 IF Q<90 AND Q<95 THEN R=3350
1550 IF Q<85 AND Q<90 THEN R=3200
1560 IF Q<80 AND Q<85 THEN R=3050
1570 IF Q<75 AND Q<80 THEN R=2950
1580 IF Q<70 AND Q<75 THEN R=2800
1590 IF Q<65 AND Q<70 THEN R=2650
1600 IF Q<60 AND Q<65 THEN R=2500
1610 IF Q<55 AND Q<60 THEN R=2350
1620 IF Q<50 AND Q<55 THEN R=2200
1630 GOTO 2070
1640 REM DIET FOR 35 YR OLDS
1650 IF Q<100 THEN GOTO 960
1660 IF Q=100 THEN R=3500

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1670 IF Q=95 AND Q<100 THEN R=3350
1680 IF Q=90 AND Q<95 THEN R=3200
1690 IF Q=85 AND Q<90 THEN R=3050
1700 IF Q=80 AND Q<85 THEN R=2900
1710 IF Q=75 AND Q<80 THEN R=2800
1720 IF Q=70 AND Q<75 THEN R=2650
1730 IF Q=65 AND Q<70 THEN R=2500
1740 IF Q=60 AND Q<65 THEN R=2400
1750 IF Q=55 AND Q<60 THEN R=2250
1760 IF Q=50 AND Q<55 THEN R=2100
1770 GOTO 2070
1780 REM DIET FOR 65 YEAR OLDS
1790 IF Q=100 THEN GOTO 960
1800 IF Q=100 THEN R=3100
1810 IF Q=95 AND Q<100 THEN R=2900
1820 IF Q=90 AND Q<95 THEN R=2800
1830 IF Q=85 AND Q<90 THEN R=2700
1840 IF Q=80 AND Q<85 THEN R=2600
1850 IF Q=75 AND Q<80 THEN R=2500
1860 IF Q=70 AND Q<75 THEN R=2400
1870 IF Q=65 AND Q<70 THEN R=2200
1880 IF Q=60 AND Q<65 THEN R=2100
1890 IF Q=55 AND Q<55 THEN R=1950
1900 IF Q=50 AND Q<55 THEN R=1850
1910 GOTO 2070
1920 REM DIET FOR 45 YEAR OLDS
1930 IF Q=100 THEN GOTO 960
1940 IF Q=100 THEN R=3400
1950 IF Q=95 AND Q<100 THEN R=3200
1960 IF Q=90 AND Q<95 THEN R=3100
1970 IF Q=85 AND Q<90 THEN R=2950
1980 IF Q=80 AND Q<85 THEN R=2800
1990 IF Q=75 AND Q<80 THEN R=2700
2000 IF Q=70 AND Q<75 THEN R=2600
2010 IF Q=65 AND Q<70 THEN R=2400
2020 IF Q=60 AND Q<65 THEN R=2300
2030 IF Q=55 AND Q<60 THEN R=2150
2040 IF Q=50 AND Q<55 THEN R=2000
2050 GOTO 2070
2060 REM ACTIVITY
2070 IF C=1 THEN GOTO 2110
2080 IF C=2 THEN R=R+0.125
2090 IF C=3 THEN R=R+0.25
2100 REM DIET CALCULATION
2110 R=R-500
2120 IF S=1 THEN R=R-500
2130 IF R=1000 THEN GOTO 2170
2140 PRINT "THIS PROGRAM DOES NOT LIST ANYTHING LESS THAN "
2150 PRINT "A 1000 CALORIE DIET"
2160 GOTO 5900
2170 PRINT# TAB(5),N$, "REQUIRES A DIET OF ",R, " CALORIES"
2180 PRINT# TAB(5),N$, "REQUIRES A DIET OF ",R, " CALORIES"
2190 PRINT# "*****"
2200 PRINT#
2210 PRINT "DO YOU WISH A COPY OF A SUITABLE DIET?(TYPE Y OR N)"
2220 INPUT Y$
2230 IF Y$="N" THEN GOTO 3860
2240 IF R>1000 AND R<1100 THEN GOSUB 2290
2250 IF R>1100 AND R<1300 THEN GOSUB 2620
2260 IF R>1300 AND R<1650 THEN GOSUB 2970
2270 IF R>1650 THEN GOSUB 3390
2280 GOTO 3810
2290 PRINT# TAB(20), "CALORIE DIET 1000"
2300 PRINT# "MEAT 6", TAB(12), "2% MILK 3", TAB(25), "VEG B 2"
2310 PRINT# "BREAD 4", TAB(12), "FRUIT 1", TAB(25), "VEG A 2"
2320 PRINT# "FAT 1"
2330 PRINT#
2340 PRINT# "BREAKFAST", TAB(15), "NO. OF PORTIONS"
2350 PRINT# "MEAT", TAB(21), "1"
2360 PRINT# "BREAD", TAB(21), "1"
2370 PRINT# "2% MILK", TAB(21), "1"
2380 PRINT# "FAT", TAB(14), "ONE-HALF"
2390 PRINT# "FRUIT", TAB(20), "NIL"
2400 PRINT#
2410 PRINT# "AM/PM SNACK"
2420 PRINT# "FRUIT", TAB(21), "1"
2430 PRINT#
2440 PRINT# "LUNCH"
2450 PRINT# "MEAT", TAB(21), "2"
2460 PRINT# "BREAD", TAB(21), "2"
2470 PRINT# "FAT", TAB(20), "NIL"
2480 PRINT# "2% MILK", TAB(21), "1"
2490 PRINT# "FRUIT", TAB(20), "NIL"

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2500 PRINT# "VEG A", TAB(21), "1"
2510 PRINT# "VEG B", TAB(21), "1"
2520 PRINT#
2530 PRINT# "DINNER"
2540 PRINT# "MEAT", TAB(21), "3"
2550 PRINT# "FAT", TAB(14), "ONE-HALF"
2560 PRINT# "2% MILK", TAB(21), "1"
2570 PRINT# "BREAD", TAB(21), "1"
2580 PRINT# "FRUIT", TAB(20), "NIL"
2590 PRINT# "VEG A", TAB(21), "1"
2600 PRINT# "VEG B", TAB(21), "1"
2610 RETURN
2620 PRINT# TAB(20), "CALORIE DIET 1200"
2630 PRINT# "BREAD 4.5", TAB(12), "FRUIT 3", TAB(25), "VEG A 2"
2640 PRINT# "2% MILK 3", TAB(12), "MEAT 6", TAB(25), "VEG B 2"
2650 PRINT# "FAT 2.5"
2660 PRINT#
2670 PRINT# "BREAKFAST", TAB(15), "NO. OF PORTIONS"
2680 PRINT# "FRUIT", TAB(21), "1"
2690 PRINT# "MEAT", TAB(21), "1"
2700 PRINT# "BREAD", TAB(21), "1"
2710 PRINT# "FAT", TAB(21), "1"
2720 PRINT# "2% MILK", TAB(21), "1"
2730 PRINT#
2740 PRINT# "LUNCH"
2750 PRINT# "FRUIT", TAB(21), "1"
2760 PRINT# "MEAT", TAB(21), "2"
2770 PRINT# "VEG A", TAB(21), "1"
2780 PRINT# "VEG B", TAB(21), "1"
2790 PRINT# "BREAD", TAB(21), "1"
2800 PRINT# "FAT", TAB(14), "ONE-HALF"
2810 PRINT# "2% MILK", TAB(14), "ONE-HALF"
2820 PRINT#
2830 PRINT# "DINNER"
2840 PRINT# "FRUIT", TAB(21), "1"
2850 PRINT# "MEAT", TAB(21), "3"
2860 PRINT# "VEG A", TAB(21), "1"
2870 PRINT# "VEG B", TAB(21), "1"
2880 PRINT# "BREAD", TAB(21), "1"
2890 PRINT# "FAT", TAB(14), "ONE-HALF"
2900 PRINT# "2% MILK", TAB(14), "ONE-HALF"
2910 PRINT#
2920 PRINT# "BEDTIME SNACK"
2930 PRINT# "BREAD", TAB(21), "1"
2940 PRINT# "FAT", TAB(14), "ONE-HALF"
2950 PRINT# "MILK", TAB(21), "1"
2960 RETURN
2970 PRINT# TAB(20), "CALORIE DIET 1500"
2980 PRINT# "FRUIT 4", TAB(12), "MEAT 6", TAB(25), "VEG A 2"
2990 PRINT# "BREAD 7.5", TAB(12), "2% MILK 4", TAB(25), "VEG B 2"
3000 PRINT# "FAT 3"
3010 PRINT#
3020 PRINT# "BREAKFAST", TAB(15), "NO. OF PORTIONS"
3030 PRINT# "FRUIT", TAB(21), "1"
3040 PRINT# "MEAT", TAB(21), "1"
3050 PRINT# "BREAD", TAB(21), "2"
3060 PRINT# "FAT", TAB(21), "1"
3070 PRINT# "2% MILK", TAB(21), "1"
3080 PRINT#
3090 PRINT# "LUNCH"
3100 PRINT# "FRUIT", TAB(21), "1"
3110 PRINT# "MEAT", TAB(21), "2"
3120 PRINT# "VEG A", TAB(21), "1"
3130 PRINT# "VEG B", TAB(21), "1"
3140 PRINT# "BREAD", TAB(21), "2"
3150 PRINT# "FAT", TAB(21), "1"
3160 PRINT# "2% MILK", TAB(21), "1"
3170 PRINT#
3180 PRINT# "DINNER"
3190 PRINT# "FRUIT", TAB(21), "1"
3200 PRINT# "MEAT", TAB(21), "3"
3210 PRINT# "VEG A", TAB(21), "1"
3220 PRINT# "VEG B", TAB(21), "1"
3230 PRINT# "BREAD", TAB(21), "1"
3240 PRINT# "FAT", TAB(14), "ONE-HALF"
3250 PRINT# "2% MILK", TAB(14), "ONE-HALF"
3260 PRINT#
3270 PRINT# "SNACK NO. 1"
3280 PRINT# "FRUIT", TAB(21), "1"
3290 PRINT#
3300 PRINT# "SNACK NO. 2"
3310 PRINT# "BREAD", TAB(21), "1"
3320 PRINT# "2% MILK", TAB(14), "ONE-HALF"

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405 PRINT:PRINT"DO YOU WISH THE CALCULATIONS PRINTED ON
THE VIDEO"
410 INPUT"OR ON THE LINE PRINTER (V/P)";X$
415 IF X$<>"P" GOTO 425
420 GOTO 925
425 FOR I=1 TO Z
430 IF A$(I)="STOP" THEN 530
435 PRINT:PRINT:PRINT:PRINT
440 PRINT"INCOME DISTRIBUTION FOR DR. ";A$(I)
445 PRINTTAB(5);"TOTAL PRODUCTION = $";TP(I)
450 PRINTTAB(5);"PERC. OF TOTAL PRODUCTION =
";PBP(I);"%
455 PRINTTAB(5);"EQUALITY FACTOR = ";EF(I);
460 PRINT"LONGEVITY SHARES = ";LF(I)
465 PRINTTAB(5);"PRODUCTION (70%) = $";PR(I)
470 PRINTTAB(5);"EQUALITY (20%) = $";EQ(I)
475 PRINTTAB(5);"LONGEVITY (10%) = $";LG(I)
480 PRINTTAB(5);"TOTAL COMPENSATION = $";TC(I);
485 PRINT" % RETURN = ";SE(I)*100
490 PRINTTAB(5);"SALARY = $";SA(I);
495 PRINT"INSURANCE = $";IN(I)
500 PRINTTAB(5);"TOTAL AMOUNT PAID TO DATE = $";TD(I)
505 PRINTTAB(5);"BONUS = $";BO(I)
510 PRINTTAB(5);"ACTUAL W-2 INCOME = $";AW(I)
515 PRINTTAB(5);"RETIREMENT DEDUCTION AT ";(PT)*100;"%
= ";PS(I)
520 INPUT"HIT =ENTER= TO CONTINUE";X
525 NEXT I
530 CLS:PRINT:PRINT:PRINT:PRINT:INPUT"WOULD YOU LIKE
LINE PRINTER OUTPUT NOW (Y/N)";X$
535 IF X$="Y" THEN 925
540 G=0:J=0:K=0:L=0:M=0:AA=0:B=0:D=0:E=0:F=0
545 CLS
550 PRINT"TO ENTER NEW DATA FROM KEYBOARD.....TYPE 1"
555 PRINT:PRINT"TO SEE THE DATA CURRENTLY IN
FILE.....TYPE 2"
560 PRINT" (TO RETURN TO PROGRAM...TYPE 2)"
565 PRINT"TO SEE AN INDIVIDUAL DOCTOR'S FILE...TYPE 3"
570 PRINT:PRINT"TO MAKE
CORRECTIONS.....TYPE 4"
575 PRINT:PRINT"TO SAVE THE CURRENT FILE ON
TAPE.....TYPE 5"
580 PRINT:PRINT"TO INPUT A FILE FROM
TAPE.....TYPE 6"
585 PRINT:PRINT"TO CONTINUE FORMULA
CALCULATIONS.....TYPE 7"
590 PRINT" (AFTER INPUTING DATA)"
595 INPUT Q:ON Q GOTO 600,670,710,760,835,875,920
600 REM ENTER DATA FROM KEYBOARD
605 CLS:PRINT:PRINT:PRINT:PRINT:INPUT "WHEN READY, HIT
=ENTER= (TO CLOSE THE FILE TYPE 'STOP')";X
610 TX=0:G=0:J=0:K=0:L=0:M=0:AA=0:B=0:D=0:E=0:F=0
615 FOR I=1 TO Z:CLS
620 IF I>31 THEN PRINT:PRINT:PRINT"NO MORE ROOM IN
FILE":PRINT"SAVE CURRENT DATA ON
TAPE":FORT=1TO200:NEXTT:GOTO 835
625 PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:INPUT "ENTER
DOCTOR NUMBER OR NAME";A$(I)
630 IF A$(I)="STOP" THEN 655
635 INPUT "TOTAL PRODUCTION";TP(I)
640 INPUT "SALARY PAID TO DATE";SA(I)
645 INPUT "INSURANCE (PAID BY PROF. CORP.)";IN(I)
650 GOTO 95
655 PRINT:PRINT:PRINT:PRINT"FILE CLOSED."
660 INPUT "TO SEE THE DIRECTIONS, HIT 'ENTER'";X
665 GOTO 545
670 REM TO SEE ENTIRE FILE
675 TX=0:G=0:J=0:K=0:L=0:M=0:AA=0:B=0:D=0:E=0:F=0
680 FOR I=1 TO Z
685 IF A$(I)="STOP" THEN 700
690 PRINT:PRINTA$(I),TP(I),SA(I),IN(I)
695 GOTO 95
700 PRINT:PRINT:INPUT "TO SEE THE DIRECTIONS, HIT
=ENTER=";X
705 GOTO 545
710 REM TO SEE INDIVIDUAL NAME
715 PRINT:PRINT:INPUT "DOCTOR NUMBER OR NAME";A$
720 FOR I=1 TO Z
725 IF A$(I)=A$ THEN 740
730 NEXT I
735 PRINT"NAME NOT IN FILE.":GOTO 745
740 PRINT:PRINTA$(I),TP(I),SA(I),IN(I)
745 PRINT:PRINT:INPUT"FOR ANOTHER NAME TYPE 1,
OTHERWISE 0";X
750 IF X=1 GOTO 710
755 GOTO 545
760 REM TO MAKE CORRECTIONS
765 PRINT:PRINT:PRINT:INPUT "ENTER DR. NO. OR NAME FOR
THE LINE TO BE CORRECTED.":A$
770 FOR I=1 TO Z
775 IF A$(I)=A$ THEN 795
780 NEXT I
785 PRINT"NAME NOT IN FILE.":GOTO 820
790 PRINT
795 PRINT"THE LINE NOW
READS:":PRINTA$(I),TP(I),SA(I),IN(I):PRINT
800 PRINT"ENTER THE CORRECTED INFO: NUMBER OR
NAME,TOTAL PROD,SALARY,INSURANCE."
805 INPUT A$(I),TP(I),SA(I),IN(I)
810 PRINT
815 PRINT"THE CORRECTED LINE READS:
":PRINTA$(I),TP(I),SA(I),IN(I)
820 PRINT:INPUT "FOR ANOTHER CORRECTION TYPE 1,
OTHERWISE 0";X
825 IF X=1 GOTO 760
830 GOTO 545
835 REM SAVE ON CASSETTE
840 PRINT:PRINT:INPUT "WHEN CASSETTE IS READY, HIT
=ENTER=";X
845 FOR I=1 TO Z:PRINT #1,A$(I),TP(I),SA(I),IN(I)
850 IF A$(I)="STOP" THEN 860
855 NEXT I
860 PRINT"COMPLETE ----- NOTE TAPE LOCATION."
865 PRINT:PRINT:INPUT "TO SEE THE DIRECTIONS, HIT
=ENTER=";X
870 GOTO 545
875 REM LOADING FROM TAPE
880 PRINT:PRINT:INPUT "WHEN CASSETTE IS READY, HIT
=ENTER=";X
885 PRINT"LOADING....."
890 FOR I=1TOZ:INPUT #1,A$(I),TP(I),SA(I),IN(I)
895 IF A$(I)="STOP" GOTO 905
900 GOTO 95
905 PRINT:PRINT:PRINT"COMPLETE ----- TURN OFF
RECORDER."
910 PRINT:PRINT:INPUT"TO SEE THE DIRECTIONS, HIT
=ENTER=";X
915 GOTO 545
920 GOTO 105
925 REM PRINT-OUT DATA
930 INPUT"IS PRINTER READY";X$
935 IF PEEK(14312)<>63 THEN PRINT"PRINTER NOT
READY":GOTO930
940 LPRINT
945 LPRINT"DR. ";TAB(19)"TOTAL PROD. ";TAB(29)%"
TOTAL";TAB(39)"PROD.=70% ";TAB(50)"EQUAL.=20%
";TAB(50)"LONG.=10% ";TAB(60)"T.COMP."
950 FORT=1TO79:LPRINT"*";NEXTT
955 LPRINT
960 FOR I=1TOZ
965 IF A$(I)="STOP" THEN 1010
970 N$="#####.##":P$="###.###"
975 LPRINTA$(I);TAB(17)USINGN$;TP(I);
980 LPRINTTAB(28)USINGP$;PBP(I);
985 LPRINTTAB(37)USINGN$;PR(I);
990 LPRINTTAB(47)USINGN$;EQ(I);
995 LPRINTTAB(57)USINGN$;LG(I);
1000 LPRINT" ";USINGN$;TC(I)
1005 NEXTI
1010 FORT=1TO79:LPRINT"*";NEXTT
1015 LPRINT
1020 LPRINT"TOTAL";TAB(17)USINGN$;TX;
1025 LPRINTTAB(28)USINGP$;G;
1030 LPRINTTAB(37)USINGN$;J;
1035 LPRINTTAB(47)USINGN$;K;
1040 LPRINTTAB(57)USINGN$;L;
1045 LPRINT" ";USINGN$;M
1050 LPRINT
1055 LPRINT"AMOUNT AVAILABLE AFTER OVERHEAD
=";USINGN$;AF
1060 LPRINT CHR$(140):REM FORM FEED
1065 LPRINT"%"
RETURN";TAB(12)"SAL.PAID";TAB(24)"INSUR.":TAB(34)"TOT.S-
&I.":TAB(47)"BONUS";TAB(58)"W2 INCOME";" ";RETIREM."
1070 FORT=1TO79:LPRINT"*";NEXTT
1075 LPRINT
1080 FOR I=1TOZ
1085 IF A$(I)="STOP" THEN 1130
1090 LPRINTUSINGP$;SE(I)*100;
1095 LPRINTTAB(10)USINGN$;SA(I);
1100 LPRINTTAB(16)USINGN$;IN(I);
1105 LPRINTTAB(31)USINGN$;TD(I);
1110 LPRINTTAB(44)USINGN$;BO(I);
1115 LPRINTTAB(57)USINGN$;AW(I);

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1120 LPRINT " :USINGN$:PS(I)
1125 NEXT I
1130 FOR=1 TO 79:LPRINT"*":NEXTT
1135 LPRINT
1140 LPRINTUSINGP$:(M/TX)*100:
1145 LPRINTTAB(10)USINGN$:AA:
1150 LPRINTTAB(19)USINGN$:B:
1155 LPRINTTAB(31)USINGN$:AA+B:
1160 LPRINTTAB(44)USINGN$:D:
1165 LPRINTTAB(57)USINGN$:F:
1170 LPRINT " :USINGN$:E
1175 LPRINT
1180 PRINT:PRINT:INPUT"TO SEE THE DIRECTIONS, HIT
=ENTER=":X
1185 GOTO 545
1190 CLS:PRINT:PRINT:PRINT:PRINT"THIS IS A PROGRAM THAT
WILL CALCULATE"
1195 PRINT"THE INCOME DISTRIBUTION FOR A GROUP OF"
1200 PRINT"PROFESSIONALS, BASED ON A SERIES OF"
1205 PRINT"VARIABLES, INCLUDING ....."
1210 PRINT"      INCOME EARNED"
1215 PRINT"      OVERHEAD EXPENSES"
1220 PRINT"      EQUALITY FACTOR"
1225 PRINT"      LONGEVITY"
1230 PRINT"      PRE-TAX DOLLAR INSURANCE PAYMENTS"
1235 PRINT"      RETIREMENT PLAN"
1240 PRINT:PRINT:INPUT"      HIT =ENTER= TO
CONTINUE":X
1245 CLS
1250 PRINT"THE FORMULA PRESENTED IS A 70 - 20 - 10
DISTRIBUTION
1255 PRINT"      70 % OF A PERSON'S COLLECTIONS IS
RETURNED TO HIM"
1260 PRINT"      AS HIS 'PRODUCTION'"
1265 PRINT"      20 % OF THE TOTAL COLLECTIONS IS
DIVIDED EQUALLY
1270 PRINT"      BY ALL THE CORPORATE MEMBERS"
1275 PRINT"      10 % OF THE TOTAL COLLECTIONS IS
DIVIDED BY 'LONGEVITY'"
1280 PRINT"      BASED ON HOW MANY YEARS A
PERSON HAS BEEN"
1285 PRINT"      A CORPORATE MEMBER ----- FOR
EXAMPLE, "
1290 PRINT"      LONGEVITY NUMBERS COULD BE
ASSIGNED AS FOLLOWS:"
1295 PRINT"      LESS THAN ONE YEAR = 0
1300 PRINT"      1 TO 2 YEARS      = 1
1305 PRINT"      2 TO 3 YEARS      = 2
1310 PRINT"      3 OR MORE YEARS   = 3
1315 PRINT"      (YOU MUST KNOW THE TOTAL NUMBER
OF LONGEVITY POINTS"
1320 PRINT"      BEFORE RUNNING THE PROGRAM)"
1325 INPUT"HIT =ENTER= TO CONTINUE":X
1330 CLS
1335 PRINT:PRINT:PRINT:PRINT"THE RETIREMENT PROGRAM IS
BASED ON A SIMPLE PERCENTAGE OF
1340 PRINT"TOTAL INCOME BEING WITHHELD, AND NOT COUNTED
AS TAXABLE"
1345 PRINT"INCOME AT THIS TIME."
1350 PRINT"MORE COMPLEX FORMULAS WOULD REQUIRE THE
ADVICE OF A TAX"
1355 PRINT"CONSULTANT AND REVISION OF THIS PART OF THE
FORMULA."
1360 PRINT:PRINT:PRINT:PRINT
1365 INPUT"HIT =ENTER= TO CONTINUE":X
1370 CLS:PRINT"ONCE THE DATA IS ENTERED FROM THE
KEYBOARD"
1375 PRINT"IT SHOULD BE SAVED ON TAPE IMMEDIATELY, SO
THAT"
1380 PRINT"ANY ERRORS OR LATER REVISIONS IN THE
FORMULA"
1385 PRINT"WILL NOT REQUIRE RETYPING ALL THE DATA."
1390 PRINT:PRINT"THE PROGRAM CAN BE RUN ON A WEEKLY,
MONTHLY, ANNUAL,"
1395 PRINT"OR ANY OTHER TIME BASE. INCOME MAY BE
ENTERED EITHER AS"
1400 PRINT"THE AMOUNT EARNED, FOR THAT SINGLE TIME
PERIOD, OR TOTAL
1405 PRINT"INCOME FOR THE ENTIRE TAX YEAR."
1410 PRINT:PRINT"THE PROGRAM DOES NOT HAVE THE
CAPABILITY OF 'SUMMING'"
1415 PRINT"CURRENT INCOME TO THAT PREVIOUSLY SAVED ON
TAPE FROM"
1420 PRINT"THE LAST PAY PERIOD."
1425 PRINT:PRINT:INPUT"HIT =ENTER= TO CONTINUE":X
1430 RETURN

```

continued from page 99

Pascal Programs

SYBEX announces the release of *Pascal Programs For Scientists And Engineers* by Alan Miller. This book contains a collection of frequently used algorithms for scientific and technical applications. Included are applications dealing with curve fitting, vectors, approximations and random number generation. A total of more than 70 algorithms are presented, and each includes a program implementation in Pascal.

An interesting feature of the book is that it describes the pitfalls of writing scientific programs in current implementations of Pascal. The book provides programs to detect these pitfalls in any particular version of Pascal and explains general techniques for solving the problems once discovered. Specific hints for retaining accuracy in Pascal programs are included throughout. The price of the book is \$16.95 in paperback or \$25 cloth bound. For more information contact SYBEX, Inc., 2344 Sixth Street, Berkeley, CA 94710; (415) 848-8233.

Circle No. 122

Circuit Design Programs

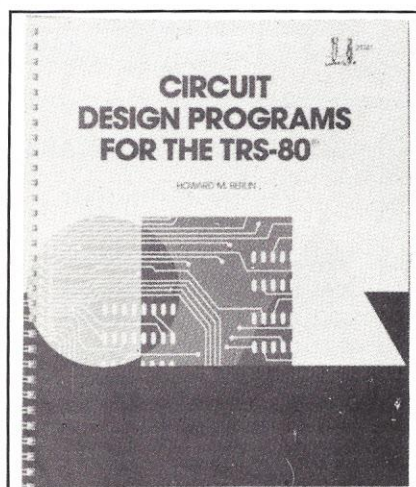
Group Technology, Ltd. announces a 138-page textbook by Howard M. Berlin, presenting 40 programs to solve problems involving plotting and statistical verification of experimental data.

Written primarily for a TRS-80 system with Level II BASIC, and 16K of random access memory, many of the routines can be adapted to run on other computer systems such as PET and Apple II. Some are written as subroutines to aid incorporation in user programs. Output is displayed on video screen, but most programs can be modified to present numerical results on a line printer. The least squares regression program can store data on cassette tape and is modified to place the created data file on disk.

Circuit Design Software consists of seven cassettes with 37 debugged, thoroughly documented programs for the TRS-80 Model I (Level II),



Apple II with Applesoft, and Ohio Scientific (OSI) microcomputers. They can be used as stand-alones or as subroutines for more complex programs and simplify the design and analysis of circuit design problems. Simultaneous equations with real and complex coefficients and polynomial roots can be solved. The effects of design parameters can be determined and graphs of various functions plotted to variable scales to fit data, the company said.



The programs are available on tape for the TRS-80 and on tape or disk for the Apple and OSI. They require 16K RAM memory in the tape format and 32K to 48K RAM on disk depending on the program. Each tape or disk includes three to eight separate programs.

Circuit Design Problems for the TRS-80 is priced at \$12.95 plus \$1 shipping and handling. Circuit Design Software is priced at \$24.95 for tapes; \$29.95 for disks plus \$1.50 shipping and handling. Virginia residents add 4% sales tax. VISA or MC accepted. For more information contact Group Technology, Ltd., P.O. Box 87s, Check, VA 24072; (703) 651-3153. *Circle No. 123*

Computer Law

Law And The Computer is an introduction to basic legal concepts and how they apply to the computer industry. Its detailed information on all aspects of computer law will enable readers to recognize potential legal problems quickly, determine

whether legal assistance is necessary, and communicate problems more effectively with legal counsel.

This book covers: Computer-related contracts and how to negotiate them; who's liable when the computer malfunctions; the current stand the law takes on computer crime; and the safeguards needed to assure that computer-generated evidence will be admissible in a court of law. It also discusses the current state of the law on copyrightability of software and firmware programs, including the protection that copyright affords as well as the pitfalls involved in using a copyright to protect computer programs. Available only in a hard-bound volume, the book costs \$19.95.

For more information contact CBI Publishing Co., Inc., 51 Sleeper St., Boston, MA 02210; (617) 426-2224. *Circle No. 124*

Mostly BASIC

Written in BASIC, each of Sams three new books contain program listings that offer something for small business owners, hobbyists, home computer users, or those who want to increase their computer knowledge.

The three books are structured in an easy-to-use format, the company said. Each chapter provides an explanation of the program, a sample run and the actual program listing. Where an interface circuit is required, complete circuit details and component listings are included. Each book has six major sections that have actual ready-to-use programs.

Section I entitled, "Real-time Applications," has four programs; a basic telephone dialer, combination lock, digital stopwatch, and a time machine that allows you to use your microcomputer as a 24-hour clock and timer to control devices. An assembly language telephone dialer for the TRS-80 Level I is included.

The Dungeon of Htam, a math educational game, is covered in Section II. Other educational programs range from foreign language flash

cards to the Reading Pacer Program that help increase reading speed. In Section III, actual business and investment program listings include a house buying guide, amortization and depreciation schedules. Home applications such as a medical expense record, recipe calculator, message taker and gas mileage calculator are among the six listings presented in Section IV. Section V provides a special selection of useful programs to use with your microcomputer in various applications from generating random numbers to basic time delays. The Tarot Card Reader, a modern adaptation of an ancient fortune telling scheme, is presented in the final section of each book.

These new books serve as a source book of BASIC routines that can be incorporated into your own programs.


Prices are \$10.95 for each version. For more information contact Howard W. Sams and Co., 4300 West 62nd St., Indianapolis, IN 46268; (317) 298-5400.

Circle No. 125

Keyboard Catalog

A 24-page catalog of Standard Keyboards is now available from George Risk Industries, Inc. Bulletin KB-20 includes data on the company's Model 753, 756, and 711 Standard keyboards, plus models ranging from 10 to 98 keys.

Featured are the new Process Control Keyboards with serial I/O for industrial control system applications, user-programmable ASCII keypads, and keyboard enclosures and accessories. Off-the-shelf models include low-cost units for hobby-educational use and keyboards suitable for a variety of prototype, limited production, and specialized applications. Ruggedized versions for heavy-duty industrial and military applications are offered.

Free copies may be requested from George Risk Industries, Inc., GRI Plaza, Kimball, NE 69145; (800) 445-5218. *Circle No. 126* 

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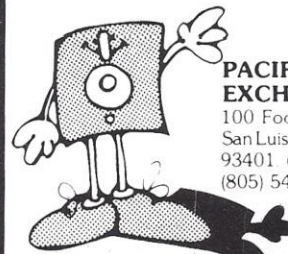
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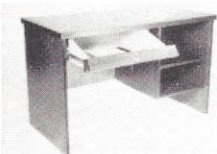
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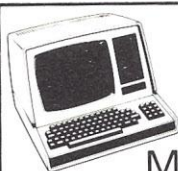
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ance sheet; income statement; columnar pad; inventory; job cost estimator; sales and profit forecaster; cash flow; and real estate investment.

Each of the forms is an electronic work sheet that has been programmed with the Universal Computing Machine and work in conjunction with its features and functions. Each portfolio is a limited business form that only small businesses or professionals can use. For example, the columnar pad has 20 rows and 17 columns and is divided into 19 line items and a total row; it has 12 months of the year and four quarterly totals and an annual total. Any totals or columns of more than three digits and two decimal places wide run together, but they can be edited for five

digits and no decimal places.


In short, the Universal Business Machine combined with the Universal Computing Machine is a reasonable financial tool.

PLAN80: latest entry

A financial modeling program that has just been introduced is PLAN80 from Business Planning Systems. It is marketed for CP/M-based systems by Digital Marketing of Walnut Creek, CA. The program is written in Pascal and has been compiled into p-code. Included on the disk is a Pascal run-time program so that it is not necessary for the user to have, or even know, anything about Pascal.

Because it is written in Pascal, the program is quite easy to transfer to other computers, and that is exactly what is being done. Business Plan-

ning Systems has arranged with Apple Computer Company to make PLAN80 available on the Apple II and it is expected to be announced by the time you read this article.

There is a significant price difference between the Apple version (\$185) and the CP/M version (\$295). But the difference is not only in the price. The CP/M version has a very useful accessory program that is not currently available for the Apple version. It is a program that acts as an interface between the user and the PLAN80 program and makes it possible for a total novice, with no financial modeling background, to use PLAN80. The user interface program asks the operator a series of questions and from the answers, generates a model by itself. 

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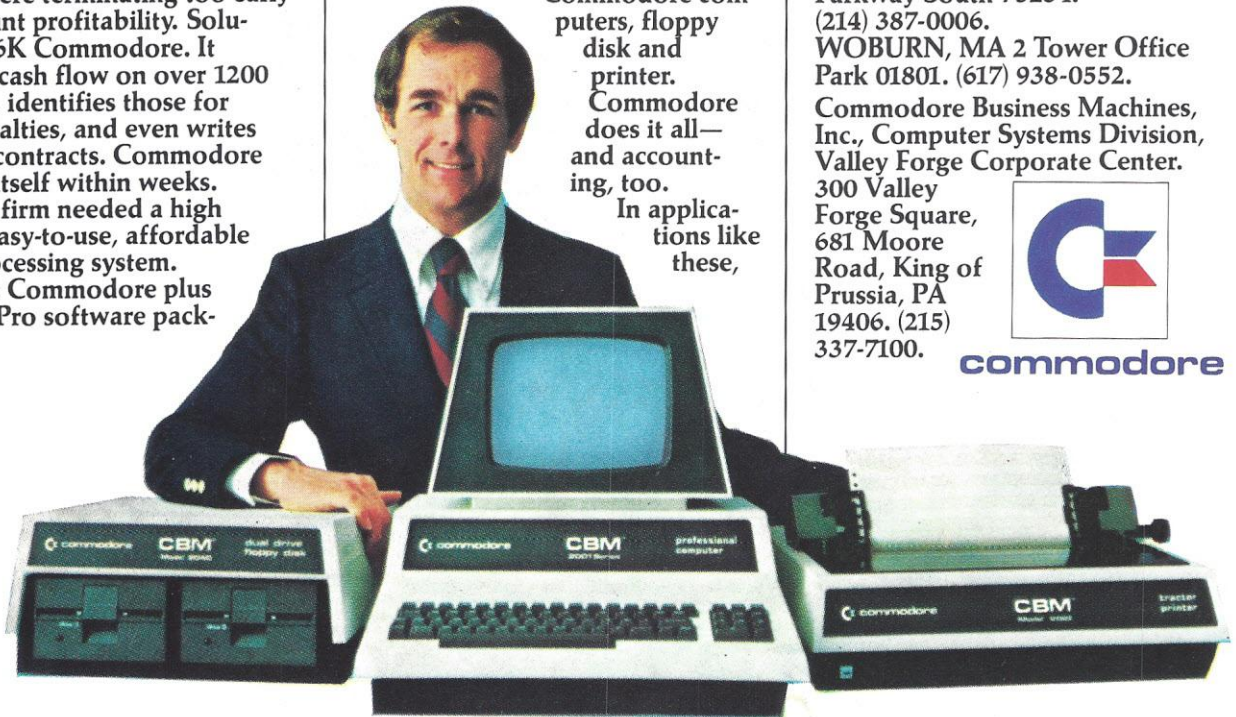
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